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JOURNAL of the AMERICAN DIETETIC ASSOCIATION

PROTEINS IN THE DIET OF CHRONIC BRIGHT'S DISEASE[1]

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CLINICAL SIGNIFICANCE OF THE TERM: CHRONIC NEPHRITIS

THE usual endeavors to cure or prevent chronic Bright's disease are confined almost entirely to efforts aimed at influencing the kidney. This is done because the kidney is regarded as the cause of this group of diseases, according to the prevalent, time-honored custom of rigid adherence to the idea that every malady must have its signs and symptoms depend upon some structural change. Such a classification of Bright's disease, on a basis of pathological anatomy of the kidney, has centered attention on this organ to the exclusion of other pathological processes. These may lie either in the realm of anatomical or of functional pathology. If we close our eyes to their existence and focus our attention only upon the kidney, we may, as clinicians, be doing our duty according to the accepted standards of scientific medicine, but we are not taking advantage of many recent advances and are thereby neglecting the welfare of the patient from certain angles. If we wish to meet therapeutic demands as they actually exist, we must base our clinical diagnosis of Bright's disease on somewhat different grounds than those which have been imposed by the pathological anatomist.

Chronic nephritis is not solely, nor primarily, a disease of the kidneys. It is a symptom complex most properly designated as Bright's disease, in which the following functional and anatomical disturbances take part:

1. Anatomical lesions in the kidneys and other tissues. (The term nephritis should be confined to this phase of Bright's disease, that is, anatomical pathology of the kidney.)

[1] Presented before the Greater New York Dietetic Association, January 9, 1933.

2. Impairment of renal function
3. Elevation of blood pressure
4. Edema
5. Anemia
6. Uremia

Each one of these phases of chronic Bright's disease is either partly or entirely an independent malady, and will be considered as such in discussing the rôle of the proteins in the dietetic therapy. Although some of these obviously overlap one another, they constitute, at the present time, the most helpful sub-division of the functional and anatomical pathologic problems in Bright's disease. Doubtlessly in the future, as various questions are cleared up and answered, another grouping will be in order.

PURPOSE OF THIS PRESENTATION

Our attitude to the problem of the dietetic treatment of sufferers with chronic Bright's disease has been directly opposed to the evident fact that the patients were human beings and required nourishment; our objectives in dietetic therapy have been centered on two ideas to the exclusion of others; namely, first, that proteins will damage kidney tissue whether normal or diseased; and second, that proteins will raise blood pressure and will produce arteriosclerosis. There are many exceptions to the above statement, but on the whole it is true; it furnishes a suitable text so that this discussion may be kept within bounds and may have a definite objective.

DIETETIC INFLUENCE ON THE RENAL LESIONS, THAT IS, NEPHRITIS

It is very apparent that two objects should be achieved by diet: first, the prevention of progress of the nephritis; and second, the restoration of the kidney tissue to a normal state. In the past and even today it is taken for granted that the end-products of protein digestion irritate the kidneys, and also that a low protein intake favors the healing process within them. This constitutes prophylactic treatment which is probably better expressed by the German term "*Schonungs Therapie*". Thus far no one has suggested that either the carbohydrates or the fats cause any damage to the kidneys. Consequently, we can confine our attention to the most effective way of regulating the proteins in the diet for the purpose of controlling the pathological changes that may occur in the kidneys and other organs and tissues.

Effect of disproportionately high protein intake on the kidney

A great deal of work has been carried out on animals which, for lack of space, cannot be detailed here. In summary, it may be said that no amount of food, comparable to that which can be consumed by man, will damage the kidneys of animals. Bischoff (1), after a very thorough review of the situation, comes to the conclusion that no dietary experiments devised thus far have definite influence on the blood vessels or the kidneys in human beings. In regard to the effect of protein food given in large amounts to human beings, the following may be mentioned: Addis (2) failed to demonstrate an increase of the formed elements in the urine after the ingestion of one and a half pounds of beefsteak; Keutmann and McCann (3) fed proteins up to 200 grams per day to four patients with chronic hemorrhagic Bright's disease, and did not produce any harmful effects; and one of the most noteworthy experiments is that of Newburgh, Falcon-Lesses and Johnston (4) who fed a man, thirty-two years old, for six months on a diet containing 337 grams of protein, of which the animal protein was constituted as follows:

	Amount eaten	*Protein*
Fresh beef liver	About 400 grams	80 grams
Fresh veal round	About 300 grams	60 grams
Fresh beef tenderloin	About 700 grams	164 grams
Dried beef	About 100 grams	33 grams
		337 grams

This diet did not increase the blood pressure. There was some increase of the albumin and casts, which disappeared ten days after the diet was discontinued. It is remarkable that any human being could have been able to consume this amount of food for this period of time. I would be tempted to consider the transient presence of albumin and casts for a period of ten days, not as evidence of damage to the kidneys under the circumstances, but rather as a sign that the tolerance for protein by the human kidneys is very much higher than that which is habitually taken, and that there is a great margin of safety beyond any diet that could be prescribed.

A number of additional observations have been made on normal individuals which show that when liberal quantities of protein are taken in the form of meat, the kidney is not affected in any way. Lieb (5) studied the explorer, Stefansson, who had existed for about nine years on a meat and fat diet, and found him to be in perfect physical condition.

Lieb (6), Tolstoi (7), and McClellan and Du Bois (8), observed two

normal men who lived for one year, under their direction, on an excessive meat and fat diet containing 100 to 140 grams of protein daily, and failed to find any signs of damage to the kidney tissue. In addition, there is the report of Thomas (9) concerning the effect of the high meat diet on the Eskimos, which apparently does not result in an elevation of the blood pressure or nephritis; also that of Krogh and Krogh (quoted by Du Bois) which states that the Greenland Eskimo, although he lives on a diet containing 280 grams of animal protein, is free from any signs of renal irritation.

The conclusion of McCann that liberal protein allowances in the diet do not of themselves injure the kidneys, should be mentioned. One of the most interesting experiments that has ever been carried out as to the effect of protein feeding in favoring the occurrence of nephritis is that of Pospischill and Weiss (10). They fed two groups of scarlet fever cases (1,186 subjects in each group) on diets containing different quantities and kinds of protein; one group received a lacto-vegetarian diet, including eggs, and the other, a diet containing large amounts of meat and meat soups. The incidence, the severity and the character of the nephritis were the same in all the children, regardless of the type and quantity of the protein consumed; there was only one difference noticed, the general physical condition of the patients who had received the meat and rather high protein ration was much more healthy and satisfactory than that of those who had been restricted to the lacto-vegetarian diet.

Effect of disproportionately low protein intake on the kidney

A deficient protein intake, that is, one which is accompanied by some protein or nitrogen loss to the body, may be continued for many months without manifestation of any damage. It may be that those persons who are so commonly met with, that are below par physically and mentally, are the victims of such an unbalanced diet. It is now evident that protein starvation is a factor in the production of serum protein deficiency and will ultimately result in the production of edema (Peters, Bruckman, Eisenman, Hald and Wakeman (11)). The observations during the World War and in the course of many famines have made this clear. Lusk (12) shows how a diet without animal foods is monotonous and consequently detrimental. He quotes Rubner in this connection, as showing that the first result of an insufficient diet is a decrease in the efficiency of laborers; there is apathy in regard to mental work, no endurance, no initiative, general weakness and tiredness, loss of energy and drive, weakness

of the legs and signs of fatigue, especially in stair climbing, sub-normal physical effort, feeling of cold, and slowing of the heart to 60, 50 and even 40 per minute; and there is an increase of susceptibility to infectious diseases, as shown by the rise of the incidence of tuberculosis in Germany during the War (this may be comparable to the high mortality rate of cases of albuminuria from tuberculosis, this data being obtained at a time when cases of albuminuria were fed a low protein ration).

McCay (13) claims that the poor condition of the Bengalis in India is due to their low protein intake and he points out very clearly that the neighboring races, with a higher protein ration, are much better physical specimens; furthermore, the Bengalis are subject to kidney disease, have a decreased resistance to infections and other diseases, and give evidence of a premature onset of tissue degeneration and senility; they exhibit want of vigor and are characterized by their tonelessness and general slowness of reaction. It is now believed by many that a continually deficient protein intake will lead not only to a lowering of the total protein and albumin content of the blood, but also to an albuminous degeneration and other damage of practically all the tissues. This has been claimed to be the cause of the changes found in the kidney, the liver, the thyroid and presumably in other organs and tissues of the body, in cases of chronic tubular nephritis, or nephrosis (Wolbach and Blackfan (14)). Barker and Kirk (15) produced renal lesions in dogs by lowering the serum proteins through "plasmapheresis." Leiter (16) was unable to confirm these findings as he was not able to demonstrate any histologic changes in the kidneys by similar experiments. However, a positive result in this connection is much more suggestive than a negative one.

Recently, Barker (17) has shown that low protein diets produce marked fatty degeneration in the liver which was repaired only very slowly, when protein was again offered in the food, since extensive damage was still present in the liver after six months. Besides the possible damage mentioned above, it is freely acknowledged that a prolonged sub-normal protein intake will result in a secondary anemia.

It is thus seen that a diet deficient in protein brings about changes in every organ and tissue of the body that render them sub-standard in carrying out the routine physiological demands.

The effect of protein food on kidneys with nephritis

The observations on this point are very few. Squier and Newburgh (18) have investigated the effect of protein foods upon the inflammatory

process existing in chronic nephritis. After a trial period of a low protein intake of 33 grams per day, they increased the amount to 100 and 175 grams a day. They found this resulted in an increased amount of albumin and red blood cells in the urine, at times an increase of edema and an exacerbation of the retinitis. It should be mentioned that, in their normal controls, red blood cells were found in the urine but that there was no albumin. The appearance of red blood cells in the urine of normal individuals with a high protein diet indicates that possibly the reaction of the diseased kidney to protein foods is not very different from the normal one. Keutmann and McCann (3) found that in cases of chronic diffuse glomerular nephritis there is no evidence that increasing the protein diet from a low level of 40 grams to 75, 150 or even 200 grams, resulted in any significant increase of hematuria, any diminution in the renal function, or an increase in the albuminuria in two out of four cases. From this and other observations one could conclude that although a high protein diet might increase albuminuria and the number of red blood cells in the urine, yet this is not necessarily significant of any real pathological damage to the kidney. Another point that may be considered in this connection is the effect of protein feeding upon the diminished amount of functional kidney substance which is frequently the result of a persistent chronic diffuse glomerular nephritis; in other words, what is the effect of a normal protein intake on a secondary contracted kidney? There is no final opinion on this point. However, we do know from many cases, and particularly from the observation of O'Hare (19), that a very much impaired renal function may be compatible with a long period of life, which points to the fact that a high concentration of urea nitrogen and other urinary excretory products in the blood is not harmful to the kidneys, but that other causes must be regarded as the reason for the progressive destruction of the glomeruli. The same might also be gathered from the observations on the long life of cases with congenital polycystic kidneys.

One of the main causes for the progressive advance of the renal lesions is the occurrence of acute nephritis during the course of the chronic disease, that is the much dreaded acute exacerbations of chronic Bright's disease. These cannot be attributed to effects of diet, but are the result of infections with the hemolytic streptococcus and, consequently, require no comment in this discussion.

The tubular lesions in the kidney are now known from many clinical observations not to be affected, but rather to be benefitted by high protein diets. Epstein (20) has been particularly active in demonstrating

the validity of this fact. It is believed that this form of nephritis is possibly a result, rather than a cause of the albuminuria and loss of body protein, and, furthermore, as we regard a high protein diet in the light of a remedy for the outstanding symptom of nephrosis, *i.e.*, edema, it would be futile to discuss the possible harmful effects that such diets would have upon tubular nephritis.

DIETETIC THERAPY OF IMPAIRED RENAL FUNCTION

Before tests for renal function were perfected, it was the impulse of every physician to curtail the protein intake in all cases exhibiting albuminuria or hypertension, on the theory that renal insufficiency must exist if the kidneys were involved. The advent of tests that measure the activity of the kidney, particularly blood chemistry, showed that there might be irritation of the kidney without any accompanying impairment of renal function. This has led to the use of higher protein diets for such patients, although the practice of giving liberal amounts of protein to persons with albuminuria is not universally followed. The penalty of a too ardent restriction of the proteins is that malnutrition and anemia develop in such patients; a low protein diet pursued over a long time will result in invalidism and a fatal issue prematurely, before renal insufficiency and the attending retention uremia would naturally close the picture. Inasmuch as it has been shown that feeding proteins will not injure the diseased kidney, it becomes perfectly apparent that in those cases of albuminuria in which the kidney function is normal, there should be no dietary restrictions. The problem becomes a different one when the kidney activity does not suffice to remove all the excretory products it should and there is an accumulation of urea and other materials within the blood.

It must be borne in mind that renal insufficiency occurring in chronic Bright's disease may be due to passive congestion, to an acute exacerbation of chronic nephritis, or to the progress of a chronic kidney lesion itself, that is, the formation of connective tissue and the destruction of glomerular units. Each of these deserves particular attention and it is only the last with which we are concerned here.

An elevation of the blood urea, or of the other nonprotein nitrogenous substances in the blood, is not necessarily productive of any discomfort to the patient or of an immediate termination of life. These only develop when the urinary excretory products in the blood heap up to a very great extent and produce either acidosis, excess of the retention of phosphates or sulphates, or because the total quantity of urinary excretory products

becomes so high that their sum total produces intoxication, resulting in retention uremia and death. There is a long intermediate period before this final stage is reached when the patient is comfortable and physically and mentally fit. If the proteins are curtailed at this time, there will be an early development of malnutrition and anemia, and the same dangers are present as I have mentioned with regard to the over-cautious dietary regulation for cases of simple albuminuria. It is not only safe, but strongly indicated, to allow these patients at least a maintenance ration of 50 grams of protein over and above their loss in albumin, as advocated by Peters and Bulger (21). A larger amount than this, up to 70 or 80 grams, is not out of place. The carbohydrates and fats, of course, must be given in sufficient quantity to have an intake of approximately 2000 calories.

These amounts of protein, and even greater ones, may be prescribed at any time when the urea nitrogen is no more than about three times the normal, that is, about 50 or 60 mgm. per 100 cc. of blood. While this is carried out the patient must be watched constantly so that the blood urea nitrogen does not rise above these levels, and an acidosis develop.

During the past fifteen years we have been constantly increasing the amounts of protein allowed patients with chronic Bright's disease, and have raised the limits of the level of blood urea nitrogen which were regarded as contra-indications to a further administration of protein food. The results, as far as the vigor and the longevity of the patient are concerned, have been improved as the period of liberal protein intake was lengthened.

The feeding of proteins to the patients with a blood urea nitrogen above the normal level does not necessarily result in an increase of this substance in the blood. It seems probable that a certain amount of blood urea, and by implication, other nonprotein nitrogenous materials, is the optimal one to stimulate renal activity and that the body maintains this level within limits, whether the protein intake be high or low. Advantage should be taken of this fact and every patient studied to determine the possibilities in any given case.

It has been shown by Mosenthal and Richards (22) and verified in many quarters, that the sufferer with chronic Bright's disease may absorb large amounts of protein material and apparently assimilate it. In other words, nitrogen balance studies are not to be regarded as an indication that nitrogen, which is not excreted, is necessarily being retained as a product that should be eliminated. Peters and his coworkers (11) showed that this assimilation could go on for a long period, in one case for almost

three months; they also demonstrated that 125 grams of protein daily was the maximal amount that could be given within the capacity of the body to store the excess of protein with maximum efficiency. The exact significance of such storage of protein material is difficult to define. It is probably an evidence that these patients have undergone previous protein starvation and are accumulating much-needed material.

By this mode of dietetic procedure the onset of retention uremia is not hastened, but the advent of anemia and malnutrition is held in abeyance. When the blood urea nitrogen rises as high as 80 mgm. per 100 cc., and retention uremia may be considered as unavoidable, it is necessary to beg the question and no longer to pay attention to the nutrition of the patient, but to yield to the advancing impairment of renal function by curtailing the protein food and raising the intake of the carbohydrates and fats to the highest possible level so that they may act as protein sparers.

DIETETIC TREATMENT OF HYPERTENSION

Hypertension may occur independently of kidney involvement, when it is considered as essential hypertension, or may accompany a nephritis. The dietetic treatment in either case is the same.

The idea that proteins, especially meats, are productive of hypertension has not been substantiated by any investigators in this field. Mosenthal (23) and Strouse and Kelman (24) failed to note any changes in the blood pressure on short periods of high protein feeding. Thomas (9) did not find an elevated blood pressure among the Eskimos who live on a very high protein diet. Lieb (5) showed that Stefansson, the Arctic explorer, who had lived for nine of his forty-three years of existence on an exclusive meat diet, had a systolic pressure of 115 and a diastolic of 55. Keutmann and McCann (3) found no rise in the arterial tension in the four cases of hemorrhagic Bright's disease which they studied, in spite of the fact that they furnished their patients a protein ration as high as 200 grams a day. Nor did Newburgh, Falcon-Lesses and Johnston (4) demonstrate any increase in blood pressure in their experiment upon a man who consumed daily the enormous quantity of 337 grams of protein, derived practically entirely from meat, for a period of six months. Many other similar investigations might be cited; the findings in each of them appear to be the same in regard to the lack of effect of protein upon the arterial tension.

It is true that a diet so low in protein as to induce malnutrition and physical weakness will lower blood pressure, according to Benedict, *et al.* (25). It is very doubtful whether this is an advantageous therapeutic measure. When the heart and arterial muscles become so weak as to be

unable to maintain the required arterial tension, there is danger that they will not meet the requirements of sustaining other vital functions adequately and that the existence of the hypertensive patient is jeopardized to a certain degree at least.

THE DIETETIC TREATMENT OF EDEMA

A fundamental discovery was made in regard to the production of edema when Epstein (20) formulated his theory that the lowered osmotic pressure of the blood incident to a diminution in the serum proteins was the cause of the accumulation of fluid in the body tissues. This has been confirmed by the experimental production of edema in animals through the removal of serum protein, by Leiter (16), Barker and Kirk (15), Frisch, Mendel and Peters (26), and others. It has also developed that the famine and war edemas are brought on in the same way. In these cases a deficient protein intake has been found to be responsible for the hypoproteinemia. All these facts make it plain that a high protein diet, accompanied by a sufficient intake of calories in carbohydrates and fats, is the best remedy for this condition. It is known, as mentioned previously, that cases of chronic Bright's disease have the power to assimilate protein, to build up their deficiency in serum albumin, and that when this occurs the edema is prone to disappear. The successful elimination of the edema, resulting from the diminished concentration of serum albumin or total serum proteins by means of a high protein diet, has been demonstrated repeatedly and is now an established routine form of treatment for this malady.

Just as edema is an effect of malnutrition, it is believed by many that the degenerative lesions in the tubular epithelium of the kidney are brought about by the same cause. Consequently a high protein diet should have the tendency to clear up the renal lesion as well as remedy the edema. Another effect of the high protein diet in combating edema is achieved by the diuretic effect of urea. An accumulation of urea in the blood is one of the most efficient means by which the amounts of urine can be increased, therefore the feeding of proteins will tend to the production of a polyuria and not one of oliguria.

THE DIETETIC TREATMENT OF ANEMIA

A secondary anemia develops sooner or later in every case of chronic Bright's disease. It comes at a time when renal function is markedly diminished. What toxic influence produces it is unknown; the only fact in regard to this phenomenon is the finding of Bradford (27) in animal

experiments in 1899, that when three-quarters of the kidney is extirpated, death occurs in from one to six months from asthenia. The dietetic methods of treatment that have been in vogue in the past, that is, the restriction of proteins in the diet, have resulted in a premature development of the anemia. This system of feeding cases of chronic Bright's disease advances the date of the occurrence of secondary anemia in such a way that these patients are prematurely invalided and die before their time; that is, they succumb to inanition and secondary anemia before retention uremia has developed. The natural course of events would be, if an adequate amount of protein were fed, that anemia would develop much more slowly, that vitality would be maintained for a much longer period, and that death would be brought about by the inevitable retention uremia, the concomitant in those cases in which the kidney lesion progresses. It might be added from the evidence now at hand that a high protein diet will not only postpone the onset of anemia, but will not accelerate the pathological changes in the kidney as is probable with a diet deficient in protein.

We know from various experiments [Kerr, Hurwitz and Whipple (28) and Robscheit-Robbins and Whipple (29)] that meats have a favorable influence on the regeneration of blood in animals that have been made anemic, and that meats have a much more favorable effect than a diet of bread and milk.

Since it is now appreciated that the patient suffering with chronic Bright's disease may assimilate protein readily [Mosenthal and Richards (23) and Peters (30)], we may expect similar effects from a high protein dietary as we have in other cases of secondary anemia. In one patient with secondary anemia (reported in the Johns Hopkins Hospital Bulletin, 1918) we obtained a remarkable result within a period of thirty-three days with a diet containing 144 grams of protein and a total of 4,105 calories, as evidenced by an increase in the hemoglobin from 20 to 55 per cent, a rise of the red blood cells from 912,000 to 3,056,000, and a retention of 287 grams of nitrogen, equalling 1,794 grams of protein or 54.4 grams of protein a day within this period. Furthermore the assimilation of protein was as good on the thirty-third day of the experiment as it had been at any time. With these possibilities before us it is tempting to treat cases of chronic Bright's disease, complicated by secondary anemia, in a similar way. This procedure may be successful unless the toxic destruction of the blood mentioned above, accompanying the development of renal insufficiency, has set in. In such cases transfusion of blood is probably the best remedy at hand and may be carried out unless retention uremia

threatens, in which case the treatment would only be a gesture and not of permanent value.

In the treatment of secondary anemia in chronic Bright's disease the main purpose of the clinician should be to prevent the onset of this unwelcome symptom. This can only be accomplished by the insistence upon a high, or at least an adequate, protein dietary. The malnutrition which a low protein diet entails not only brings about the secondary anemia, but probably predisposes the subject to the invasion of infectious diseases, and it is for this reason that so many of the subjects of chronic albuminuria succumb to tuberculosis.

DIETETIC TREATMENT OF UREMIA

The so-called forms of uremia, occurring in chronic Bright's disease, are conditions that differ so much, one from the other, that they should not be included under the same name.

Uremia may be caused by the effect of the toxins of the invading hemolytic streptocccus on the central nervous system; this is the type of uremia found in acute nephritis and in acute exacerbations of chronic Bright's disease. It may be the result of hypertension, producing a cerebral arteriosclerosis and an encephalomalacia, or it may be brought about by renal insufficiency presenting the picture of so-called retention uremia. It is only the last of these that concerns us at the present moment.

The dietetic treatment of retention uremia may be given in a word. Its purpose is to eliminate as many urinary excretory products from the body as possible. This can be brought about in two ways: in the first place, by diminishing the protein intake, and it is only in the treatment of this phase of chronic Bright's disease that a restriction of the protein intake is warranted; and in the second place by making the greatest possible effort to administer as much carbohydrate and fat as possible, since these foods act as protein sparers and with them less protein is metabolized than if they are withheld entirely. However, it must be borne in mind that whenever such a dietary program is carried out, we are begging the question of keeping the patient in a fit physical condition. In other words, we are arriving at a point where we are treating the disease and not the patient.

CONCLUSION

There is only one contra-indication to a full protein ration for persons suffering with chronic Bright's disease, and that is retention uremia. An uncalled-for restriction of the protein intake will favor the progress of

degenerative processes in the kidney, will predispose to infections that may result in acute exacerbations of a chronic nephritis, or in bacterial invasions, especially by the tubercle bacillus, the pneumococcus or the hemolytic streptococcus, will not postpone the advent of retention uremia, will not diminish the blood pressure except by loss of strength in the cardiac, arterial and systemic muscles, will favor the development of edema, and will bring about devastating malnutrition and anemia resulting in an unnecessary loss of vitality and a premature death.

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DIETARY HABITS DURING PREGNANCY[1]

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INTRODUCTION

FEW complete dietary studies on women during pregnancy are recorded in the literature. Usually the investigator is interested in measuring only a limited number of the constituents of a complete diet. Sometimes the diet has been experimental, or at least not typical of that obtained in the average home. Too frequently the composition of the diet has been computed from published figures for the various foodstuffs and the data represent varying degrees of accuracy.

The dietary studies presented in this paper are for 15 women during a total of 48 observation periods covering 212 days of pregnancy. Case histories are given along with figures from the analyses for protein, fat, carbohydrate, and calories, together with those on calcium, phosphorus, magnesium, and iron compiled from various other publications (1 to 4).

The value of these data lies in the considerably greater accuracy coming from diets analyzed throughout, with nothing computed from published analyses; in the kind of subjects used, representing a group rarely studied apart, although normal women living under usual home conditions and receiving average present-day American diets; and finally, in the fact that parallel metabolic studies on the subjects, together with records of success or failure in maternity, aid in evaluating the adequacy of the diets.

EXPERIMENTAL

For the most part the methods used for measuring the diets and analyzing the foods were those described elsewhere (5). The women lived in their own homes and carried on their usual routine of household tasks. With but few exceptions, Sundays, Saturdays, and Mondays, and other days of probable irregular dietary habits, were successfully avoided in the diet study periods which usually covered 4 days, although many of the earlier ones included 5 and 6 days.

The investigator went to the home at meal time and weighed the food

[1] Published with the permission of the Director of the Agricultural Experiment Station, Stillwater, Oklahoma. Received for publication, January 17, 1933.

[2] Mary Pemberton Nourse Memorial Fellow of the American Association of University Women, 1931–32.

immediately before it was served, taking such precautions in mixing foods well, or weighing separately the components of salads and various combinations, as were necessary to insure accuracy in the samples taken for analyses. Food composites representing one-tenth of the intake were prepared, removed to the laboratory, dried on a water bath, and ground for chemical analysis.

Calcium, phosphorus, and magnesium were determined gravimetrically by the McCrudden-Shohl (6), the Neumann-Pemberton (6, 7) and the Epperson (8) procedures, respectively. Iron was determined colorimetrically by a modification of the Kennedy method (2). For fat, the official method of extracting with ether (9) was used, and for total nitrogen the Arnold-Gunning modification of the macro-Kjeldahl procedure (10). Crude protein was computed from total nitrogen, using the 6.25 factor, and carbohydrate was calculated as the difference between the total dry weight and the summed weights of fat and protein. In Group 1 the total calories were computed from these proximate analyses for protein, fat, and carbohydrate. In Group 2 total calories were computed in this manner and were also determined by use of the oxycalorimeter (11).[3]

The results from the two methods for total calories were compared critically in order to evaluate the accuracy of each as applied to food composites. It was found necessary to extract the food sample with warm water, removing soluble carbohydrate and drying again to constant weight before extracting with anhydrous ether for 20 hours, in order to obtain comparable results with the two methods.

In some diets there was still a divergence of results, from 1 to 5 per cent, the oxycalorimeter yielding the lower values. The discrepancy was not due to error from the use of the 6.25 factor for calculating the amount of crude protein (12), since even in diets where much of the protein came from cereals, for which 5.8 is a more accurate factor, the plus error in protein would be compensated by lower amounts of carbohydrate with an isodynamic value. It was observed that the difference in the two methods tended to a maximum in diets highest in fat, and to a minimum in diets lowest in fat. The discrepancy in total calories therefore was believed to be due to difficulties in the method for fat determination, such as incomplete removal of soluble carbohydrates and especially rapid moisture changes during the weighing processes. With the amount of fat present in these samples there was no difficulty with sooting or in-

[3] The author is indebted to Anna T. Schiefelbusch for the oxycalorimeter determinations of the total calories.

complete combustion in the oxycalorimeter, such as has often been encountered in this laboratory in burning pecans or other nuts; and the results were more consistent than those from the proximate analyses.

RESULTS AND DISCUSSION

Table 1 gives a summary of the case histories of the women in the two groups. Group 1 was composed of women living in Chicago, 1927–'29; Group 2, of women living in Oklahoma, 1931–'32. Eight of the subjects

TABLE 1

Summary of case histories

CASE	PARITY	DURATION OF GESTATION	DATE OF PARTURITION	AGE	HEIGHT	BEGINNING WEIGHT	WEIGHT DEVIATION*	FINAL WEIGHT	TOTAL GAIN	WEIGHT OF INFANT		LACTATION
		weeks		*years*	*inches*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*ozs.*	
Group 1												
A	I	40	6– 8–28	22	60	125	+10	160	35	7	12	+++
B	II	40	4– 2–29	27	64	150	+20	170	20	7	4	++
C	II	40	2–27–29	24	66	128	−5			6	13	++++
D	I	40	2–26–29	26	64	140	+10	175	35	6	15	++
E	I	41	6– 6–29	29	66	130	−5	170	40	8	3	++++
G	IV	39	7– 7–28	35	60	117	−3	145	28	8	13	++++
H	I	41	10– 2–28	28	65	114	−17	142	28	6	15	++
I	II	41	11–13–27	32	60	122	+2	145	23	7	0	++++
Group 2												
I	I	40	1– 3–32	27	62	108	−13	140	32	8	12	+++
II	I	38	1– 6–32	27	61	110	−9	134	24	8	0	+++
III	II	40	5–23–32	28	66	131	−4	165	34	9	12	++++
IV	III	40	6–19–32	31	71	187	+30	202	15	8	0	++++
V	I	40	6– 7–32	21	65	120	−8	145	25	8	4	+
VI	I	40	7–18–32	23	66	113	−20	148	35	7	6	++++

* Weight deviation from commonly used standards (Woods).

were primiparae, 4 secundiparae, one a tripara, and one a quadripara. The period of gestation was normal in most cases, with a tendency to prolonged gestation in the northern group. The numbers observed were too few to show whether or not this tendency may have been associated with the lower mineral retentions in that group (1). The length of gestation seemed in no way related to total gain in weight, or to the birth weight of the offspring; nor was there a correlation between the total maternal gain and the weight of the infant.

A tendency to smaller babies was observed in the northern group, in

spite of the fact that more of these mothers were multiparae and with slightly longer gestation periods. It seems probable that this difference may be related to the lower mineral retentions of the mother, hence poorer skeletal development in the fetus as compared with the degree of perfection of these features in the southern women (3). More statistical studies are needed to verify this explanation.

The total gains in weight were related quite closely to the weight status of the mother at the beginning of gestation. Usually smaller gains were made by the overweight mothers (Cases B and IV) and excessive gains by those most underweight (Cases VI and E). Such maternal accretions would obviously be limited also by the quality of the diets chosen. Unfortunately most of the underweight cases were concentrated in Group 2, but metabolism studies on nitrogen (13) showed that storage of this element was not markedly accelerated in this group, as is often true with underweight children (14). The higher storage in this more underweight group was limited to calcium and phosphorus (3), explanation for which is to be sought in factors other than their weight status.

Lactation was more successful in the multiparae and, as will be shown later, was more related to the quality of the diet than to the total gains exhibited by the mother. These facts suggest that it is the existing maternal reserves, whether acquired before or during gestation, and the food habits of the mother, characteristic of both the ante partum and post partum periods, that are important factors in lactation.

Table 2 shows the figures for the individual diets during the various periods when the subjects were being studied. The average 24-hour intake fluctuated considerably from period to period and seemed little related to any phase of gestation. The highest food consumption tended to come early in pregnancy for those women with low reserves. Case A was included in this group, being so classed by the time studies were begun on her because she had previously experienced 8 weeks of severe nausea and low food intake. The increase in food intake due to pregnancy cannot be estimated from this series, since only for Case I (one) was there a pre-gestation study.

The protein intake was low both by weight and by percentage of total calories. In only two instances was it over 100 grams daily, while 9 of the 48 diets contained less than 60 grams daily. These figures obtain in spite of the fact that the method used for computing crude protein leads to a positive error more often than to a negative one, the 6.25 factor being accurate for the proteins in animal foods and legumes, but too high

TABLE 2

Food intake during pregnancy

CASE AND PERIOD	WEEK OF PREGNANCY	AVERAGE DAILY CONSUMPTION				DISTRIBUTION OF CALORIES*	NUTRITIVE RATIO 1:	AVERAGE DAILY CONSUMPTION				Ca:P RATIO
		Calories	Protein	Fat	CHO			Calcium	Phosphorus	Magnesium	Iron	
			grams	*grams*	*grams*	*per cent*		*grams*	*grams*	*gram*	*mgm.*	
Group 1												
A 1	12	1,730	51	58	251	12:30:58	7.5	0.727	0.948	0.236	9.69	0.77
2	20	3,005	87	125	383	12:37:51	7.6	1.624	2.065	0.470	15.73	0.78
3	28	3,087	85	127	401	11:37:52	8.1	1.491	1.868	0.478	15.60	0.80
4	33	2,160	63	76	306	12:32:56	7.6	1.314	1.552	0.657	14.60	0.85
5	39	1,730	51	50	269	12:26:62	7.5	1.192	1.288	0.810	9.70	0.92
B 1	16	2,165	65	62	321	12:29:59	7.3	1.096	1.328	0.275	12.40	0.82
2	22	2,473	72	93	337	12:34:54	7.6	1.214	1.618	0.339	14.96	0.75
3	29	2,665	68	105	362	10:35:55	8.8	0.784	1.139	0.278	13.52	0.69
4	35	2,376	62	84	344	10:32:58	8.7	1.026	1.210	0.294	11.68	0.85
5	39	2,423	63	87	347	10:32:58	8.6	0.745	1.227	0.466	12.84	0.61
C 1	27	2,262	67	122	224	12:48:40	7.4	0.716	1.147	0.252	12.83	0.62
2	33	2,374	79	122	240	13:46:41	6.5	1.078	1.492	0.243	11.92	0.72
3	37	2,589	82	105	329	13:36:51	6.9	1.346	1.687	0.282	15.47	0.80
D 1	30	2,169	66	77	303	12:32:56	7.2	1.125	1.375	0.318	18.52	0.82
2	34	2,382	57	74	372	10:28:62	9.4	1.182	1.329	0.371	15.24	0.89
3	38	2,715	60	91	414	9:30:61	10.3	1.044	1.248	0.409	15.51	0.84
E 1	11	2,505	86	113	286	14:40:46	6.3	1.152	1.562	0.358	18.73	0.74
2	21	3,276	89	152	388	11:42:47	8.2	1.705	2.210	0.480	19.45	0.77
3	32	2,984	81	128	377	11:38:51	8.2	1.508	1.858	0.411	16.30	0.81
F	15	2,911	67	139	348	9:43:48	9.9	0.790	1.287	0.280	19.27	0.61
G	29	2,217	67	113	233	12:46:42	7.3	0.603	0.942	0.269	14.64	0.64
H	36	2,398	48	107	313	8:40:52	11.5	0.694	1.193	0.321	13.01	0.58
I	39	2,357	70	125	238	12:48:40	7.4	1.046	1.336	0.328	16.95	0.78
Group 2												
I 0	−4	1,724	57			12:	7.4	0.726	1.226			0.59
1	2	2,115	59			11:	7.9	0.697	1.448			0.48
2	27	2,164	60	87	286	11:36:53	8.0	1.253	1.431	0.327	9.45	0.87
3	31	2,249	62	81	318	11:32:57	8.1	1.199	1.374	0.359	10.64	0.87
4	34	2,136	62	76	301	12:32:56	7.6	1.291	1.402	0.294	11.16	0.92
5	38	2,299	55	74	353	10:29:61	9.4	1.242	1.388	0.315	11.76	0.93
II 1	26	2,752	74	120	344	11:39:50	8.3	1.796	1.986	0.446	17.38	0.90
2	30	2,880	89	128	343	12:40:48	7.1	1.773	2.083	0.510	34.88	0.85
3	34	2,870	91	126	343	12:40:48	6.9	1.820	2.067	0.521	24.14	0.88
4	38							1.827	1.754	0.523		1.09

TABLE 2—*Concluded*

CASE AND PERIOD	WEEK OF PREGNANCY	AVERAGE DAILY CONSUMPTION				DISTRIBUTION OF CALORIES*	NUTRITIVE RATIO 1:	AVERAGE DAILY CONSUMPTION				Ca:P RATIO
		Calories	Protein	Fat	CHO			Calcium	Phosphorus	Magnesium	Iron	
			grams	*grams*	*grams*	*per cent*		*grams*	*grams*	*gram*	*mgm.*	
Group 2												
III 1	33	2,702	72	126	320	11:42:47	8.4	0.902	1.371	0.285	11.71	0.67
2	37	3,093	80	117	430	10:34:56	8.7	1.441	1.791	0.395	15.74	0.80
IV 1	31	2,980	74	136	365	10:41:49	9.1	1.022	1.562	0.446	15.98	0.65
2	35	2,744	61	116	364	9:38:53	10.2	1.236	1.281	0.385	11.96	0.96
3	39	3,585	73	153	479	8:39:53	11.3	1.562	1.612	0.435	13.76	0.97
V 1	28	2,461	63	93	343	10:34:56	8.8	0.886	1.182	0.326	13.17	0.75
2	33	2,293	50	95	309	9:37:54	10.4	0.809	1.050	0.291	14.21	0.77
3	38	2,601	63	105	351	10:36:54	9.3	1.033	1.261	0.381	11.62	0.82
4	39	2,459	56	91	354	9:33:58	10.0	1.071	1.271	0.352	12.73	0.84
VI 1	18	2,982	111	134	333	15:40:45	5.7	2.375	2.556	0.471	33.58	0.93
2	23	3,043	120	115	382	16:34:50	5.3	2.085	2.345	0.462	18.32	0.89
3	27	2,674	85	101	356	13:34:53	6.9	1.449	1.528	0.325	12.19	0.95
4	31	2,592	75	76	402	12:26:62	7.6	1.748	1.827	0.399	16.27	0.96
5	35	2,378	75	82	335	13:31:56	6.9	1.861	1.844	0.405	12.16	1.01
6	38	2,170	62	62	341	11:26:63	7.7	1.558	1.753	0.409	13.62	0.89

* Protein: Fat: Carbohydrate.

for the protein in cereals and vegetables (12). The distribution of calories allots a minimum (8 to 12 per cent) to protein in most cases. Only one woman (Case VI) chose liberally (15 to 16 per cent) a part of the time. There is a corresponding tendency for the calories from carbohydrate to be high, if measured by commonly used standards: 10 to 15 per cent from protein, 35 to 38 from fat, and 47 to 55 from carbohydrate (15). The means for percentage distribution of calories in the diets of these women were 11, 35, and 54, respectively, compared to a ratio of 15:37:48 found for Macy's three women with superior lactation capacities and diets liberal in every respect (16). On the other hand, Sandiford's woman (17) averaged 2111 calories, 87 grams of protein, 108 of fat, and 184 of carbohydrate daily during pregnancy, compared to the 15 women of this report for whom the mean daily consumption was 2497 calories, 70 grams of protein, 103 of fat, and 336 of carbohydrate, thus emphasizing again the lower protein and higher carbohydrate in these diets.

The nutritive ratio, likewise, was comparatively wide in these diets, varying from 1:5.3 to 1:11.5, with a mean of 1:8.1. Hoobler (18) found a

ratio of 1:6 or less best adapted to the needs of the nursing mother, and Adair recommended ratios narrower than 1:8 (19). It is noteworthy that the women least successful in lactation showed the widest ratios in their diets (Cases D, H, and V), and also that the Detroit women (20), so successful in lactation, showed a mean ratio during pregnancy of 1:5.2, which was less than the narrowest of this series.

All such data must of course be evaluated with a knowledge of the quality of the protein, whether of animal or vegetable origin, and of the adequacy of other factors, particularly the available vitamin B complex in the diet (21); but they do emphasize the probability that in the enthusiasm for including plenty of fruits and vegetables in the diet, there may be a tendency to slight the quantity and quality of protein.

Lane (22) described an apparently successful reproductive cycle in one human mother on a diet very low in animal protein, but no figures were presented for biochemical analyses to indicate some of the metabolic changes taking place during the pregnancy.

The mineral intakes for the individual periods (Table 2) appear for the most part to be liberal when compared to commonly used standards of 1.0 grams for calcium, 1.32 for phosphorus, and 15 mgs. for iron (15). However, the metabolic balances showed that in general the calcium, and perhaps also the phosphorus, was inadequate for the women in Group 1, and that the iron intakes failed to meet the needs of Group 2. Less is known of the amounts of magnesium needed for the human adult, but there is evidence that it was also deficient in the diets of Group 1. Therefore the means for the entire series, 1.247 grams of calcium, 1.527 of phosphorus, 0.384 of magnesium, and 15.22 mg. of iron daily, should be taken to represent intakes none too liberal when coming from a mixed diet.

The subject of Ca:P ratio of intake receives considerable attention in animal feeding and in the production of experimental rickets (23), but it is doubtful whether the ratio in the usual human dietary of mixed foods varies widely enough to be of significance. It is of interest that the habitual diets of these women afforded a Ca:P ratio which seldom rose above 1.0 and with a mean of 0.81. In fact, as recorded in the literature, the usual diets chosen by gravid women rarely contain more calcium than phosphorus (20, 24 to 26), and yet such women have seemed capable of storing these elements in varying proportions up to 2:1, irrespective of the ratio of the intake. Artificially-fed infants usually receive more calcium than phosphorus (27), and human breast milk contains these elements in the approximate ratio of 2:1 (16).

TABLE 3

Average daily food intake per kilogram of body weight

CASE	WEIGHT	NUMBER OF DAYS OBSERVED	CALORIES	PROTEIN	FAT	CHO	CALCIUM	PHOSPHORUS	MAGNESIUM	IRON
Calculated for actual weight at beginning of gestation										
	kgm.			*grams*	*grams*	*grams*	*gram*	*gram*	*mgm.*	*mgm.*
Group 1										
A	56.7	27	41	1.2	1.5	5.7	0.022	0.027	9.3	0.23
B	68.0	25	36	1.0	1.3	5.0	0.014	0.019	4.8	0.19
C	58.0	15	42	1.3	2.0	4.6	0.018	0.025	4.5	0.23
D	63.5	13	38	0.9	1.3	5.7	0.018	0.021	5.8	0.26
E	59.0	15	46	1.4	1.4	5.9	0.025	0.032	7.0	0.31
F	73.5	5	40	0.9	1.9	4.7	0.011	0.017	3.8	0.26
G	53.1	5	42	1.3	2.1	4.4	0.011	0.018	5.1	0.28
H	51.7	5	46	0.9	2.1	6.0	0.013	0.023	6.2	0.25
I	55.3	6	43	1.3	2.3	4.3	0.019	0.024	5.9	0.31
Group 2										
I (one)	49.0	22	45	1.2	1.6	6.4	0.023	0.029	6.6	0.22
II	49.9	14	58	1.7	2.5	6.9	0.037	0.039	10.0	0.51
III	59.4	8	49	1.3	2.0	6.3	0.020	0.027	5.7	0.23
IV	84.8	12	37	0.8	1.6	4.7	0.015	0.017	5.0	0.16
V	54.4	16	45	1.1	1.8	6.2	0.017	0.022	6.2	0.24
VI	50.3	24	52	1.7	1.9	7.1	0.037	0.039	8.2	0.35
Calculated for weight predicted from statistical averages										
Group 1										
A	52.2		45	1.3	1.7	6.2	0.024	0.030	10.1	0.25
B	59.0		41	1.1	1.5	5.8	0.016	0.022	5.6	0.22
C	60.3		40	1.3	1.9	4.4	0.017	0.024	4.3	0.22
D	59.0		41	1.0	1.4	6.1	0.019	0.022	6.2	0.29
E	61.2		48	1.4	2.1	5.7	0.024	0.030	6.8	0.30
F	67.0		43	1.0	2.1	5.2	0.012	0.019	4.2	0.29
G	54.4		41	1.2	2.1	4.3	0.011	0.017	4.9	0.27
H	59.4		40	0.8	1.8	5.3	0.012	0.020	5.4	0.22
I	54.4		43	1.3	2.3	4.4	0.019	0.024	6.0	0.31
Group 2										
I (one)	59.4		38	1.0	1.3	5.3	0.019	0.024	5.5	0.18
II	54.0		52	1.6	2.3	6.4	0.034	0.036	9.3	0.47
III	61.2		47	1.2	2.0	6.1	0.019	0.026	5.5	0.22
IV	66.7		46	1.0	2.0	6.0	0.019	0.022	6.3	0.21
V	58.1		42	1.0	1.6	5.8	0.016	0.021	5.8	0.22
VI	60.3		44	1.4	1.6	5.9	0.031	0.033	6.8	0.29

Comparison of the 24-hour food consumption of gravid women recognizes little difference in the maintenance requirements of the maternal

organisms, but places the emphasis on gestational needs. On the other hand, any comparison of the intake on the basis of body weight minimizes the importance of fetal requirements which constitute a fairly constant factor for all cases, and do not exhibit variations which parallel the differences in the weight and size of the mothers. Neither method is therefore wholly satisfactory for such individuals.

Certain discrepancies must also be reckoned with in any method of comparing intakes. On the basis of actual weight the intake per kilogram will be low for the overweight woman and high for the thin one, whereas the actual requirements of the two may represent even wider differences in the same directions—lower still for the woman with plenty of reserves, higher still for the other. On the basis of average weight, as near as present statistics can predict such weight, the intake per kilogram gives what might be termed a common criterion for measuring relative differences in individual diets.

In Table 3 both methods have been used. The average daily food intake per woman has been calculated on the basis of actual body weight as it existed at the beginning of gestation, and on the basis of the predicted weight for an average woman of the same height and age (Woods' table (15)).

The calories per kilogram of actual weight ranged from 36 to 58, with a mean of 44. The same mean resulted for the predicted weight series, but with a narrower range (38 to 52) and with 13 of the 15 diets falling within the interval of 40 to 50 calories.

The protein intake, likewise, showed less variation when compared according to predicted body weight and means which were identical, 1.2 grams per kilo. From the protein intake, as well as that of the minerals, the superiority of the diets of Cases II and VI and the inferiority of those of Cases F, H, I (one), and V are evident. Most of these diets were superior in protein content to those previously reported for college women in this section (28), although it is interesting that Cases I and V served as subjects in the earlier study also.

The better calcium intake of Group 2 is accented when compared on the basis of predicted weight. The metabolic records of this group indicated that an intake of at least 0.020 gram of calcium per kilogram was desirable when the individuals received the amounts of sunshine recorded for these women. The mean for either series was 0.020 gram of calcium per kilogram. Regardless of the weight series used, a mean of 0.025 gram per kilogram obtained for phosphorus and 6.2 mg. for magnesium, but the range of intake was wide for the latter element. The iron intake

was 0.2 to 0.3 mg. per kilogram of body weight daily in 85 per cent of the cases, and showed a mean of 0.27 mg.

On the whole this comparison of diets on the basis of intake per kilogram of body weight showed little differences in the food habits of the two groups of women; in fact each group included individuals with correspondingly high or low diets (Cases II, VI, and E). Although considerable progress has been made (29), our knowledge of quantitative nutrition and food composition has not yet reached a state whereby these diets can be compared throughout as to adequacy of vitamins. Information is lacking for some foodstuffs and is confusing for others. The relative amounts of certain food materials chosen by the women have been tabulated in other articles (2, 4, 13). Aside from the tendency to somewhat more milk and vegetables in the Oklahoma diets and the access to much more sunshine for these women, the vitamin qualities of the two groups of diets probably did not differ markedly.

It is desirable to emphasize at this point that the above figures represent the dietary habits of a group of women during pregnancy and are intended in no way to set up dietary standards for such individuals. Nor can standards for these conditions be outlined, even tentatively, without much more information concerning the metabolic changes taking place during human gestation, and then only with parallel specifications as to the sources of the nutrition materials and the amounts of accessory factors needed to aid in the utilization of the stated allowances.

SUMMARY

1. Data from the analyses of the usual home diets are presented for 15 women during 48 observation periods covering a total of 212 days of pregnancy.

2. Irregularities in choice of food were shown by the same individual from time to time during a given gestation, and wide variations in dietary habits were exhibited by women living under similar conditions of climate, household activities, and other environmental factors.

3. The means for the 24-hour food consumption in all diets were as follows: total calories, 2497; protein, 70 gms.; fat, 103 gms.; carbohydrate, 336 gms.; calcium, 1.247 gms.; phosphorus, 1.527 gms.; magnesium, 0.384 gm.; and iron, 15.22 mg.

4. The mean intake per kilogram of pre-gravid body weight was: calories 44; protein 1.2 gms.; fat 1.8 gms.; carbohydrate 5.5 gms.; calcium 0.020 gm.; phosphorus 0.025 gm.; magnesium 6.2 mgs.; and iron 0.27 mg. each daily. Less variable results were obtained when predicted

non-pregnant weight instead of actual weight was used, and the means were the same for either method.

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THE RELATION OF THE QUALITY OF VEGETABLES TO THE WASTE INCURRED AND THE TIME USED IN THEIR PREPARATION[1]

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INTRODUCTION

DATA pertaining to the waste incurred and the time used in preparation of vegetables for cooking and serving in form suitable for use by institution managers are meager, and for the most part unsatisfactory. The most extensive sources of data are reports by Atwater and Bryant (1899), Chatfield and Adams (1931), Smith and McAuley (n.d.), Bateson, *et al.* (1931–32), and Simpson (1932). Of these, only the three latter studies were made under institutional conditions. The percentage of waste reported varies markedly from one investigator to another. The variety and grades of the vegetables are not stated. Little or nothing is known of the working conditions. The season of the year is not stated, a factor which will make marked differences in the results obtained from year to year. Another item that should receive consideration before the data are comparable is the quality difference that exists in the vegetables studied. The present study reports some preliminary data, accumulated in the food service department of the Memorial Union, on the relation of the quality of the vegetables served to the waste incurred, and the time needed for their preparation.

REVIEW OF PREVIOUS WORK

In order to facilitate comparisons, the most important data available in the literature are summarized in table 1.

For years the standard source of data on the chemical composition of American food materials was Bulletin 28, compiled by Atwater and Bryant (1899). They recognized that the amount of inedible material varied with the method of preparing vegetables and could not be accurately estimated. The figures that they reported were assumed to represent the approximate amount of refuse in foods as they are ordinarily prepared.

Chatfield and Adams (1931), among those engaged at present in the

[1] These data are taken from the thesis of Geneva P. Crouch submitted in partial fulfillment for the degree Master of Science, June, 1931. Received for publication April 15, 1933.

revision of Bulletin 28, have reported from a critical study of the source material the proximate composition of fresh vegetables. In order to avoid confusion they have specified under the name of each vegetable the portion considered edible, and under refuse the portions discarded. Figures for the minimum, maximum, and average waste, together with

TABLE 1

Summary of the paring waste data from the literature and comparison with the present findings

VEGETABLE	PER CENT OF PREPARATION WASTE FROM VEGETABLES AS PURCHASED											
	Atwater and Bryant (1899)	Chatfield and Adams (1931)	Smith and McAuley (n.d.)	Bateson *et al.* (1931–32)	Simpson (1932)	Goodenow (1932)	Present study (1931)	Harkness (1927)	Thompson, *et al.* (1928)	Thiessen (1931)		Swartz (1929–30)
										29–30	30–31	
Potatoes	20	16	22.5H 19.1M		29.7	24.2H 27.7M	20				25	18.3
Potatoes (new)							20					
Potatoes (sweet)	20	14			35.6		25.9	18.1		15.6	19	
Carrots (old)	20	37	27.7H 18.2M	36* 10.5	27.0	28.9H 23.8M	14.5	17.5		16.8	35	20.7
Carrots (new)												17.5
Radishes	30	51					21.6					
Turnips	30	13	17.6H 14.4M			29.6H 23.5M	50	20		22.6 13.9	39 29	21.7 25.1
Asparagus		25					26.1					53
Celery (in rough)	20	37	31.3		35.3		7.4	22 37	50			
Cabbage	15	27	18.9	30.52	31.7		36.1	18.9				
Lettuce	15	31	38.3		44.1		38.2	29.2				
Spinach		18	18	17.80			28.2					
Peas	45	55		58.72			63.8					
Peas (new)												29.9
Beans, string	7	10	6.8	8.07			12.9		13			12
Cucumbers	15	30	24.4				17.5					
Tomatoes		2	4		11.9		7.7		1			
Cauliflower		55	31.5	54.36*	49		74.7		64			

H—hand peeled.

M—machine peeled.

* Gross waste includes both crate and preparation waste.

the probable error, are presented. Their average figures only are recorded in table 1. The percentage discarded as refuse is greater than that reported by Atwater and Bryant for all except white potatoes, sweet potatoes and turnips, for which three vegetables it was less. These data were not accumulated under institutional situations.

Smith and McAuley (n.d.) have shown that the method used in the preparation of vegetables has a decided influence on the amount of waste incurred. Steaming, scraping or baking of the root and root-like vegetables were found to be the most economical methods of preparation. Machine peeling resulted in less waste than hand peeling for every vegetable where this comparison was made. Less time per pound was needed for machine-peeling also. The time consumed in the vegetable preparation, as well as the amount of waste, decreased with supervision of the general worker.

Bateson, *et al.* (1931–32) have summarized the preliminary findings of a committee of the American Dietetic Association on the yields of fresh vegetables. Their purpose was to collect such information as would be useful in estimating the amounts to purchase and the number of servings to be obtained from a given quantity of vegetables, and to present the pertinent findings. The waste is reported as "per cent of gross waste," a term which includes preparation waste plus crate waste, if any, divided by the trade net. Their figures for waste in cabbage and peas are much higher than any previously reported. Those for bunch carrots and cauliflower agree with figures reported by Chatfield and Adams (1931).

Simpson (1932), studying the preparation waste and plate waste in the dining hall of the University of New Mexico, has reported figures for some of the vegetables included in this study. Menus typical of those served throughout the year were served in November and repeated in December of 1931. During February and March of 1932 each item which had appeared in the menus was served again on two separate occasions, and in combination with other foods than those with which it had been previously served. This was done to lessen the influence of any particular food combination upon the waste of the food item being studied.

The cabbage used was shipped from California and had many thick, tough, outside leaves which were discarded. It was all shredded, whether cooked or used for salads. The carrots used were young, bunched, and from California. They were purchased with the tops on; these were removed later, leaving about three-fourths of an inch of the stem before weighing was done. The surrounding green leaves of the cauliflower were also removed. This leaf waste made up about half of the original weight of the vegetable. The celery leaves were included in the celery waste, which was intermediate between the figures reported by Chatfield and Adams, and Smith and McAuley. The waste in lettuce varied more from day to day, and from lot to lot, than did that from any other

vegetable. Only the coarse, outer leaves which were unfit for salad garnishes were discarded. The waste was found to be higher for this vegetable than that reported by any of the other investigators. The potatoes were of the variety known as Colorado McClure Reds, and were the only potatoes on the market at the time the study was made. They were small and irregular in shape. Dowe (1931) has emphasized the importance of size and regularity of shape in minimizing waste from tubers. In addition, the paring machine used was an old model and this probably contributed to the waste from the carrots as well as from the potatoes. The tomatoes were not of the best quality but were of the best then obtainable on the market. The hard portions about the stem end and the skins were removed. This information is given because it should aid in the interpretation of the data presented for each vegetable. It also emphasizes the importance of such information where comparisons with the results of other investigators are to be made.

Dowe (1931) studied the relation of size, shape and eye-depth of potatoes to their paring waste, and also the waste due to defects which can occur under the present United States grade standards in potatoes as delivered on the Boston market. Maine potatoes of the Green Mountain variety were hand-pared carefully in order to determine the actual amounts these different factors contributed to the waste and the variations in total waste occurring in U. S. Grade No. 1 market potatoes. A special vegetable parer, having a paring slit one millimeter (1/25 inch) in width was used, thus the parings were approximately uniform in thickness. The waste due to each factor was weighed separately. Except in the study of eye-depth, the eyes were considered a part of the parings and were carefully removed with a sharp knife. The time factor was not considered. It was found that the average per cent of waste decreased with an increase in the size of the tubers, being 9.77 $\pm$.051 per cent for small, 8.44 $\pm$.119 for medium, and 7.76 $\pm$.055 per cent for large tubers. In careful hand-paring the shape of the tubers was found to be a less important factor in paring waste than was size. A uniform shape, however, is highly desirable for potatoes that are to be pared by machine.

Eye-depths of the potatoes were found to contribute greatly to the paring waste. This amounted to 17.7 per cent of the total waste for tubers of Bliss Triumph, a deep-eyed variety, 12.8 per cent of the total waste for Cobblers, a medium-eyed variety, and 5.4 per cent of the total waste for Green Mountain tubers, a shallow-eyed variety. This eye-depth factor is also more important when the tubers are to be machine-

pared than when they are hand-pared as in this study. Ten tubers per sample were used for each of these tests.

The average waste for the Maine U. S. No. 1 grade potatoes was 13.48 per cent, of which approximately one-third was due to defects such as rot, bruises with rots, cuts with and without rot, sunburn, growth, cracks, etc. The samples for these latter tests were approximately ten pounds each.

Goodenow (1932) made a comparative study of the cost of preparing vegetables by machine and by hand in institutions. She reported the average per cent of waste for potatoes, carrots, and turnips, but not for the other vegetables studied. She concluded that the saving in labor from machine peeling of these three vegetables was sufficiently large to enable the institution using a moderate amount of these vegetables to save the price of the machine in a comparatively short length of its period of service, and that, furthermore, the appearance of the mechanically prepared product would also justify its use. The waste was decreased in machine paring, except with the potatoes.

Somewhat less pertinent are the results from the next four studies, because they were not made under institutional conditions and because the collection of the waste data was not the primary objective of the studies. They are reviewed, however, because they extend our information about certain of the vegetables.

Harkness (1927), in a preliminary report, investigated some of the problems that are encountered in the determination of the waste in foods. A general method of work was adopted. A portion of each food was selected and its weight, as purchased, recorded in grams. This amount was then prepared for cooking as for table service, so far as possible by the methods ordinarily used in the home. Since the use of water would cause errors in weights, none was added during the process. The weights of the edible portion and the waste were recorded and from these figures the percentage of refuse was determined. She reported the minimum, maximum, and average per cent of waste for two fruits and for the following vegetables: cabbage, carrots, celery, lettuce, sweet potatoes, peppers, and turnips. She concluded from her study that conditions need to be standardized if waste figures are to be helpful.

Thompson, Feely, and Fillmore (1928) studied the relative cost of nutrients in vegetable foods. Their purpose was to compare the variations in price and the approximate weight of the edible material from markets in different localities. They found that the vegetables varied considerably as to the number in the bunch, the size, the quality, and the

weight. The per cent of waste which they report is recorded per pound for some vegetables, and per bunch or stalk for the others. There are only four vegetables therefore which can be compared for per cent of waste with those of the present study. They are string beans, 12 per cent waste from 1 pound, and tomatoes, one per cent from 1 pound. Sixty-four per cent of a small head of cauliflower was waste. Their comment about celery was "The waste averaged about half the total weight as purchased."

Thiessen (1931) compared the percentage of waste in the paring of different kinds of vegetables which she used in a study of vegetable cooking at high altitude. The loss in paring was approximately one-third for old carrots, parsnips, rutabagas and old turnips. It was about one-fourth for young carrots, young turnips, and Irish potatoes. The vegetables which had been kept in storage for some time lost more in paring than did the unstored vegetables. Thus the importance of knowing the age of the vegetable is indicated.

Swartz (1933) has furnished data secured in a vegetable cookery project conducted during 1929–30. These data are recorded as minimum, maximum and average wastes for the vegetables studied. The number of tests for each vegetable is also given. The carrots and turnips used were both old and new. The new turnips had more waste than the old ones. More striking, however, is the figure for fresh peas. The waste, 29.9 per cent, is from 15 to 34 per cent less than that reported for peas by any other investigator. The figure for potatoes is in line with those reported by others.

The tendency in these studies seems to be to record the number of trials or checks made, but to omit the weight of vegetable used and moreover to give no index of the quality of the vegetables used or of the variability of the results secured, thus making comparisons of studies difficult. In addition, the average figures reported may not be a true picture of the "market run" of the vegetables in question because they will vary from year to year, season to season, and from one variety to another. The quantity, the quality, and the variety of the vegetable should be stated, and the extent of the variability of the waste determined.

METHOD OF PROCEDURE

The experimental work was done during April, May, and June of 1931. Not many locally raised vegetables are available at that time of year so that the bulk of the vegetables used was shipped in. The vegetables were all purchased through wholesale or local dealers in Des Moines. It

was not possible to learn how long the vegetables had been in cold storage previous to their arrival at the Union. Here they were held in cold storage until they were used, not more than one or two days as a rule. The storage facilities were excellent. A record was kept of the quality of vegetable as purchased, the state in which it was grown, the time it was held in storage after its arrival at the Union and of the condition and appearance of the vegetable when it was brought out of the store room.

This rating of the quality of the vegetable was an "eye" rating made by the junior author and was dependent upon memory for comparison with previous ratings. As many as four qualities of one vegetable were available during the period of the study in some cases, in others only one or two qualities were available. The vegetables were the best the market afforded at the time of purchase.

The vegetables were weighed before and after paring. If washed before paring the moist parings were allowed to air-dry before they were weighed. The carrots and potatoes were machine peeled and then completed by hand. The peeling machine used was a Hobart model. The other vegetables were prepared entirely by hand. The inedible refuse was weighed and designated as preparation waste. Parings from the peeling machine were weighed separately from the hand-parings. Fairbanks scales were used.

The usual portions regarded as inedible were removed in preparation. The skins of the tomatoes were loosened by letting them stand a few minutes, first in hot water then in cold. The loosened skins and the stem ends were then removed with a paring knife. Any portion of the tomato which did not slice nicely was chopped and used in salads. This kept the waste to a minimum.

The cucumbers not suitable for slicing were chopped and used in salads, therefore only the skins and ends were removed as parings.

Three women participated in the preparation of the vegetables. Two of them worked very rapidly, the third somewhat less rapidly. The preparation time reported was the total time of these three workers.

The vegetables studied were asparagus, string beans, carrots, cabbage, cauliflower, celery, cucumbers, lettuce, potatoes, peas, radishes, spinach, tomatoes, and turnips.

RESULTS WITH DISCUSSION

For purposes of comparison, the data are summarized in tables. Table 2 groups the vegetables that were served most frequently during the time

of the study and for which comparison of the preparation waste by quality was possible. In table 3 the figure for waste represents the average obtained from all trials, regardless of the quality of the vegetable, and also the figures for those vegetables of which one quality only was studied. The quality rating is given for those vegetables. The turnips and cauliflower were each served but once that season because they were so poor. The waste was excessive in these two vegetables. This is readily seen by contrasting our findings for these two vegetables with those of other investigators as presented in table 1.

Preparation waste

It will be seen from table 2 that the paring waste per pound of vegetable increased as the quality of the vegetable decreased, for every vegetable except cabbage studied under uniform conditions. The one lot of very good new potatoes, also an exception, were hand-pared and may not be contrasted with the other two lots of good and fair new potatoes which were machine-pared and finished by hand. The difference in waste between the two lots that were treated similarly is in accord with the above findings.

The cabbage was purchased by the number of heads and weighed from 2 to 3.5 pounds per head. The uniformity in head size within each lot was greater than that among the various lots as a whole. The best grade of cabbage had the heaviest heads, averaging 2.7 pounds per head in weight, but this grade had the highest per cent of waste since more of the woody fiber in the center stem had to be discarded as unsuitable for use. There was less waste in the good and fair grades of cabbage which averaged 2.4 and 2.2 pounds per head, respectively, because more of the stem portion could be used. In the one lot of poor cabbage the waste was greatly increased over that of the good and fair grades of cabbage, even though the heads were approximately of the same weight, *i.e.*, 2.3 pounds per head. The heads of smallest weight, those that averaged 2.2 pounds each, even though of fair quality only, had the least paring waste.

The peas are an interesting example of the deceptiveness of appearance in relation to yield. Approximately two-thirds of the original weight of the peas was waste, regardless of their quality. The size of the peas and the thickness of the pods apparently nearly balanced each other and the waste was high for each quality.

The average paring wastes varied widely (*see* table 3). They ranged from the minimum, 7.4 per cent for celery, to the excessive waste of 74.7 per cent for cauliflower. In order to simplify these data and put them in

TABLE 2

The relation of the quality of the vegetable to the waste incurred and the time required for preparation of vegetables

TYPE, NAME AND SOURCE	AVERAGE WEIGHT PREPARED	TIMES CHECKED	QUALITY RATING	WASTE			AVERAGE TIME PER POUND	METHOD OF PEELING
				Average	Maximum	Minimum		
	pounds	*number*		*per cent*	*per cent*	*per cent*	*minutes*	
Root vegetables:								
Potatoes, (Idaho)	100.0	8	Good	16.0	19.0	15.0	0.9	M* and H†
	99.0	6	Fair	22.6	25.0	20.7	1.2	M and H
Russets	100.0	1	Poor	36.0			1.1	M and H
Potatoes new (Texas)	26.2	4	Very good	24.0	33.3	20.0	2.5	H only
	100.0	2	Good	15.7	16.0	15.5	1.5	M and H
	100.0	2	Fair	19.5	20.0	19.0	1.7	M and H
Radishes (Iowa)	5.1	4	Very good	19.5	25.0	15.0	4.3	H
	6.8	5	Good	22.8	30.0	15.6	3.9	H
Stalks or stems:								
Asparagus (Iowa)	35.8	5	Good	23.0	28.0	19.2	1.2	H
	33.8	2	Fair	34.1	34.3	34.0	1.4	H
Leafy:								
Cabbage (California)	16.0	7	Very good	34.8	64.3	16.7	1.5	H
	16.7	7	Good	28.9	40.0	21.9	1.2	H
	16.2	6	Fair	26.3	40.0	14.3	1.3	H
	19.0	1	Poor	31.6			1.1	H
Lettuce (California)	69.3	5	Very good	20.9	31.6	15.1	0.2	H
	71.0	6	Good	31.7	36.7	19.5	0.2	H
	57.7	6	Fair	40.3	42.9	39.0	0.2	H
	80.0	5	Poor	58.1	69.6	48.7	0.3	H
Spinach (Idaho and Iowa)	23.2	8	Good	23.8	34.4	10.9	2.9	H
	21.7	7	Poor	33.5	50.0	24.7	3.2	H
Seeds:								
Peas (California)	34.0	6	Very good	64.3	69.5	62.3	4.4	H
	32.1	7	Good	64.8	74.6	57.4	4.0	H
	29.6	2	Fair	68.4	74.8	63.0	4.8	H
Fruits:								
Beans, string	30.4	8	Good	11.1	16.4	7.1	3.1	H
	32.8	3	Fair	17.2	19.7	15.0	4.3	H
Tomatoes (Mexico)	7.8	3	Very good	6.4	6.7	6.3	1.1	H
	11.8	16	Good	7.7	11.4	3.3	1.7	H
	11.7	3	Fair	8.6	12.5	6.7	1.4	H

* M—machine-peeled.

† H—hand-peeled.

form convenient for use, the vegetables were sorted according to their average paring wastes, then grouped into three divisions, *i.e.*, those that lost 7 to 17.5 per cent in paring, those that lost 20 to 38 per cent, and those that lost 50 to 75 per cent. In each lot the first vegetable named had the lowest waste and the last named showed the greatest waste.

TABLE 3

Summary of the average wastes and of the average time required in the preparation of vegetables

TYPE AND NAME	WEIGHT AS PURCHASED	RANGE IN QUALITY	WASTE			AVERAGE TIME PER POUND
			Average	Maximum	Minimum	
	pounds		*per cent*	*per cent*	*per cent*	*minutes*
Root vegetables:						
Carrots	514.0	Good	15.0	22.5	6.3	1.4
Potatoes, new	505.0	Fair to very good	19.0	Table 2	Table 2	1.8
Potatoes	1,496.5	Poor to good	20.0	Table 2	Table 2	1.1
Radishes	54.5	Good and very good	21.6	Table 2	Table 2	4.1
Potatoes, sweet	291.0	Good	25.9	26	24.2	1.2
Turnips	10.0	Poor	50.0			3.0
Stalks or stems:						
Celery	293.0	Good	7.4	11.7	4.5	1.8
Asparagus	246.5	Fair to good	26.1	Table 2	Table 2	1.3
Leafy:						
Spinach	337.3	Poor and good	28.2	Table 2	Table 2	3.1
Cabbage	344.8	Poor to very good	36.1	Table 2	Table 2	1.9
Lettuce	1,518.0	Poor to very good	38.2	Table 2	Table 2	0.2
Seeds:						
Peas	476.0	Fair to very good	63.7	Table 2	Table 2	4.3
Fruits:						
Tomatoes	248.0	Fair to very good	7.7	Table 2	Table 2	1.6
Beans, string	341.8	Fair to good	12.9	Table 2	Table 2	3.4
Cucumbers	61.5	Very good	17.5	23.4	11.4	1.4
Flower:						
Cauliflower	138.3	Poor	74.7	84.9	64.9	0.5

There were no vegetables that fell in the 40 to 50 per cent range, therefore that does not appear in this grouping.

Preparation time

The vegetables were sorted according to the average preparation time used. They were then classified into three groups: those that could be

prepared in less than one minute per pound; those that took from one to two minutes per pound for preparation; and those requiring three to five minutes. Probably the last group is the most important to the dietitian from the standpoint of her food service.

The string beans, peas and turnips fall in the group with those vegetables which take the most time to prepare; however the waste in preparation of the string beans was low, whereas that from the turnips and peas was high. Where help is plentiful it would probably be economical to use

TABLE 4

Vegetables grouped according to their average percentage of paring waste

7 TO 17.5 PER CENT	20 TO 38 PER CENT	50 TO 75 PER CENT
Celery	Potatoes	Turnips
Tomatoes	Radishes	Peas
Beans, string	Potatoes, sweet	Cauliflower
Carrots	Asparagus	
Cucumbers	Spinach	
	Cabbage	
	Lettuce	

TABLE 5

Vegetables grouped according to the time per pound needed for preparation

UNDER 1 MINUTE	1 TO 2 MINUTES	3 TO 5 MINUTES
Lettuce	Potatoes	Turnips
Cauliflower	Potatoes, sweet	Spinach
	Asparagus	Beans, string
	Cucumbers	Radishes
	Tomatoes	Peas
	Celery	
	Potatoes, new	
	Cabbage	

string beans in spite of the long preparation time. Spinach and radishes take much time for preparation and are intermediate in the amount of waste. Probably none but the very best grade of spinach should ever be purchased when fresh spinach is to be served.

In general it took less time per pound to prepare the better grade of vegetables than it took for the poorer grades. Occasionally, however, the poorest grade required less time per pound because so much of the vegetable had to be discarded. This was evident in the time used for preparing poor cabbage and fair tomatoes.

SUMMARY

The percentage of waste from 7,648 pounds of fifteen vegetables of several qualities, and the time per pound needed for their preparation for cooking were determined. The vegetables were rated in quality according to their appearance. All the vegetables were hand-pared except the potatoes and carrots. The latter were machine-pared first, then finished by hand.

The average paring losses of the vegetables studied ranged from 7 to 75 per cent of the original weight of the vegetables as purchased. In the main, the paring losses from the vegetables where two or more qualities of vegetable were available for comparison were found to increase as the corresponding quality of the vegetables decreased.

The preparation time needed depended upon the quality of the vegetable and the type of operation necessary, being greater for those vegetables that needed a large amount of handling, such as peas, beans and radishes, and less for those such as lettuce and cauliflower that needed a small amount of handling.

It has been shown that the data collected previously are inadequate in many respects and it is therefore urged that dietitians enlarge upon the study presented in this report. They have an unusual opportunity to accumulate valuable material because they have access to large quantities of vegetables of different variety and quality, from season to season and year to year. Such studies should lead to a demand for vegetables of a certain type, and thus aid materially in standardizing the varieties obtainable on the market.

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THE BASAL METABOLISM OF SOME AMERICAN INDIAN GIRLS[1]

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INTERESTING contributions have been made by various investigators to the question of the possible relationship between race and basal metabolism. MacLeod, Crofts and Benedict (1) found that 9 Oriental women living in this country had an average deviation of −10.4 per cent below the Harris and Benedict standard and −10.2 per cent below the Aub and DuBois. Steggerda and Benedict (7) report figures below the average of whites, for some browns and blacks living in Jamaica. Necheles (3) also found a lower rate of metabolism among the Orientals. Ocampo, Cordero and Conception (4) obtained basal figures much below the standards for a group of Filipinos. Mason and Benedict (2) also found that South Indian women have requirements below the standards.

Figures obtained in the studies mentioned above seem to suggest that individuals of the darker skinned races have basal energy needs below those of the white race. More recently, however, Benedict and his coworkers (8, 5, 6) have reported studies made on the Maya Indians of Yucatan which show that these people are an exception to this theory. Figures consistently higher than standard were obtained in all of their investigations.

Through the coöperation of Superintendent B. J. Brophy of the United States Indian School at Flandreau, South Dakota, the opportunity was given for further study of the racial factor in basal metabolism by obtaining figures on full-blooded American Indian girl students. The plan of this study was first, to note how figures for a group of Indian girls compare with standard figures for individuals of the same sex, age, weight, and height; and second, to compare the figures obtained for this group with those from a similar group of white girls living in the same physical environment and, as nearly as possible, under the same general conditions.

The Indian subjects ranged from 18 to 20 years of age and were selected on the basis of physical and medical records. Only those who were found to be free from any condition known to affect metabolism, and who were within the average weight range for age and height were selected. The subjects lived in the school dormitory and followed a carefully supervised schedule, arising each morning at six and going to bed

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TABLE 1

Metabolism results obtained on 5 Indian girls

SUBJECT	AGE	HEIGHT	WEIGHT	WEIGHT DEVIATION	SURFACE AREA	CALORIES			DEVIATIONS			
						24 hr.	Sq.m.	Kgm. 24 hr.	Aub-DuBois	Girl scout	Harris-Benedict	Dreyer
		cm.	*kgm.*	*per cent*	*sq.m.*							
1	18	157.4	52.0	3.0	1.50	1,315	36.54	25.2	−8.6	15.6	−2.9	−4.5
2	18	166.6	60.3	0.0	1.68	1,926	47.79	31.9	19.4	46.3	32.9	29.8
3	19	164.5	55.6	−2.2	1.60	1,590	41.44	28.5	8.9	30.7	13.7	12.4
4	20	156.2	49.5	6.9	1.47	1,480	41.98	29.8	10.5	36.6	11.7	11.7
5	20	168.2	62.1	3.4	1.72	1,423	34.48	22.9	−6.8	5.4	−2.9	−4.1
Average deviations (excluding 2)									1.0	22.8	4.9	3.9

TABLE 2

Metabolism results obtained on 6 white girls

SUBJECT	AGE	HEIGHT	WEIGHT	WEIGHT DEVIATION	SURFACE AREA	CALORIES			DEVIATIONS			
						24 hr.	Sq.m.	Kgm. 24 hr.	Aub-DuBois	Girl scout	Harris-Benedict	Dreyer
		cm.	*kgm.*	*per cent*	*sq.m.*							
1	19	159.4	62.7	15.4	1.65	1,487	37.58	23.6	−1.1	8.2	1.7	0.9
1	20	158.7	57.3	5.0	1.58	1,315	35.19	22.9	−4.8	5.0	−10.3	−7.7
2	20	155.0	49.5	−7.8	1.46	1,255	35.82	25.3	−5.7	16.0	−4.9	−5.2
3	20	170.6	62.7	2.2	1.74	1,581	37.87	25.2	−0.03	15.5	7.0	6.1
4	21	163.8	51.3	−10.2	1.53	1,499	40.79	29.2	10.2		19.5	11.9
5	22	167.6	58.6	−2.3	1.66	1,474	36.99	25.2	0.0		3.57	3.53
6	22	166.3	58.8	0.0	1.64	1,409	35.80	23.9	−3.2		−1.2	−0.1
Average deviations (excluding 4)									−0.76	11.7	−0.68	−0.42

TABLE 3

Comparison of Indian girls with white girls

(Subject 2 of the Indian girls, whose metabolism was much higher than that of any other, and subject 4 of the white girls, who was more than 10 per cent overweight, were excluded in the final averages and comparisons.)

	AVERAGE TOTAL CALORIES	AVERAGE CALORIES PER SQ.M. PER HR.	AVERAGE CALORIES PER KGM. PER 24 HR.	DEVIATIONS			
				Aub-DuBois	Girl scout	Harris-Benedict	Dreyer
White girls	1,431	37.15	25.02	−0.76	11.7	−0.68	−0.42
Indian girls	1,452	38.61	26.6	1.0	22.8	4.9	3.9
Per cent deviation of Indian girls—white girls	1.5	3.9	5.4				

at nine-thirty, with the exception of week-ends. Meals were taken in the dining hall of the school, were similar to meals served in other school dining rooms, and tended to be high in carbohydrate. The evening meal was served at five-thirty and as it was practically impossible for the students to obtain food at other than meal hours, since the school was some distance from a town, it was felt that the possibility of surreptitious eating need not be considered.

The white girls used as subjects were students in the State University and were living as nearly as possible under the same conditions as the Indian girls. All were native South Dakotans, normal as far as could be determined, and, with the exception of Subject 1, were within the weight range allowed for individuals of their sex, age and height. Subject 1, at the beginning of the study, was 15.4 per cent above the average, but at the time the last figures were obtained she had dropped to 5.0 per cent above. Since all these girls were advanced students of nutrition and understood the nature and purpose of the study, good coöperation was obtained. It was thus felt that there was no reason to question basal condition.

The general procedure was the same with both groups. The subjects had no food after supper the night preceding the metabolism tests, and were in bed not later than ten-thirty. Tests were made before arising the following morning. In the case of the Indian girls, the night was spent in a ward of the school hospital. The white subjects either spent the night in the school infirmary or preceded the test by a rest period of thirty minutes to one hour. All tests, with the exception of Subject 3 in the Indian group, were made between menstrual periods.

The apparatus used was of the student type and had previously been checked with a Benedict-Roth and a Sanborn-Benedict apparatus. The apparatus was also tested before each period of use. All tests were run in duplicate and each Indian girl was studied on two consecutive mornings. This was not possible with all of the white girls. Only those results that checked within 5 per cent were used for the final calculations.

Table 1 gives the figures for the group of five Indian girls, and the comparison of basal figures obtained with those of the standards. Table 2 gives figures for white girls residing in the state of South Dakota, and Table 3 compares the results obtained on the Indians, with those of the white subjects.

SUMMARY

Basal metabolism figures of five full-blooded American Indian girls, ranging from 18 to 20 years of age, showed an average deviation of 1 per

cent from the Aub and DuBois standard, 4.9 per cent from the Harris and Benedict, and 3.9 per cent from the Dreyer standards.

A similar group of white girls, of the same locality, showed a deviation of 0.76 per cent from the Aub and DuBois, −0.68 per cent from Harris and Benedict, and −0.42 per cent from the Dreyer standards.

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STUDIES IN THE FOOD REQUIREMENT OF ADOLESCENT GIRLS: IV. THE MINERAL INTAKE OF 38 WELL-NOURISHED GIRLS 10 TO 16 YEARS OF AGE[1]

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THIS article reports the mineral intakes of 38 of the adolescent girls whose energy and protein intakes are given in preceding papers (23, 24). It is recognized that, as in the case of protein, mineral intakes cannot be regarded as requirements, but are merely indications of amounts on which children have apparently thrived. Taken in connection with the few balances which are available they are of interest and may be suggestive of good practice. The records of these 38 girls are therefore presented, following a review of the literature on both balances and intakes.

LITERATURE

Calcium and phosphorus balance studies

Reports of 79 calcium balances on 32 girls and 69 phosphorus balances on 25 girls, 10 to 13 years of age, are found in the literature; none, however, appears on girls over 13 years of age. The intakes of the 13 well-nourished girls varied from 0.425 to 1.944 grams of calcium, and from 0.639 to 2.009 grams of phosphorus, with positive balances in all cases with the exception of one for calcium and four for phosphorus. The retentions per kilo, however, varied greatly and were to some extent, though not regularly, related to the intake.

Four girls in this age group, studied by Sherman and Hawley (19), stored 0.3 to 0.62 gram or 0.01 gram per kilogram of calcium, and 0.3 to 0.53 gram or slightly less than 0.01 gram per kilo of phosphorus, on intakes of approximately 1.00 and from 1.3 to 1.46 grams, respectively, of these minerals. These workers observed that an increase in calcium and phosphorus, by the use of additional milk, resulted in a correspondingly increased retention of calcium and to a lesser extent of phosphorus. They concluded the optimum storage of calcium is obtained when the diet contains one quart of milk. This conclusion was based in part on observations of a 12-year-old girl who "stored only 0.007 gram of calcium per kilo body weight when receiving 250 grams of milk per day.

[1] Contribution No. 148, Mass. Agri. Exp. Station.

As the intake of milk increased there was increased retention of calcium up to 0.022 gram per kilo with 1000 grams of milk and of 0.023 gram per kilo with 1500 grams of milk." It may also be observed from the authors' tables, that the retention of calcium was 0.021 gram per kilo on 750 grams of milk, or an intake of 0.994 gram of calcium, while the maximum retention of phosphorus occurred at this level of milk intake. More variable and less favorable retentions were found when vegetables replaced about half of the milk as a source of calcium.

In observations of 10 normal and 50 underweight children 4 to 13 years of age with calcium intakes higher than the standards set by Sherman and Hawley, Wang and her coworkers (25, 26) found retentions ranging from 0.002 to 0.020 gram per kilogram, with a slight tendency to greater storage in the underweights, and an average retention of 0.008 gram per kilo for the "vigorous normals." They likewise observed that without exception all children on intakes above 0.023 gram of calcium and 0.035 gram of phosphorus per kilo were storing minerals, while below these amounts there was a negative balance. This calcium minimum is approximately that observed by Sherman and Hawley on their 12-year-old girl. The four normal girls of 10 to 12 years included in Wang's study had intakes much above these minimums, and were all in positive balance.

A number of investigations, in which adolescent girls were subjects, have been made to study the effects of diet on the utilization of calcium and phosphorus. Chaney and Blunt (4) observed two healthy but somewhat underweight girls, 10 to 11 years of age, who retained from 0.201 to 0.710 gram of calcium on intakes which varied from 1.173 to 2.42 grams for three-day periods. The phosphorus intake for the same period varied from 2.555 to 3.375 grams, the retention from −0.142 to +0.568 gram. Willard and Blunt (27) report two studies on one 12-year-old girl who, with a calcium intake of approximately 1.3 grams per day, stored 0.017 and 0.013 gram of calcium per kilogram, and 0.009 and 0.006 gram of phosphorus on an intake of 1.26 grams. Kramer, Latske, and Shaw (7) found that, on an intake of approximately one gram of calcium, two girls of 10 and 12 years stored from 0.008 to 0.025 gram per kilogram, and on a phosphorus intake of 0.639 to 0.702 gram they retained 0.008 to 0.014 gram per kilogram. Burton (3) reported that two healthy girls, 12 and 13 years of age, were in slight positive balance on an intake of 0.96 gram, but were in equilibrium or negative balance when the intake was reduced to 0.68 gram. On a phosphorus intake of 1.21 grams there was a 25 per cent retention or 0.011 and 0.018 gram per kilogram in the one case, but a negative balance occurred on an intake of 1.35 grams in the second.

In the foregoing studies the subjects were so-called healthy children, although some were underweight. Stearns, Oelke, and Boyd (20) have recently reported observations on two girls with late rickets, together with one normal control, first on diets low and then high in these minerals. Cod liver oil or irradiated ergosterol was given daily. On the first diets, which contained less than 0.2 gram of calcium and 0.7 gram of phosphorus, these subjects barely maintained equilibrium or were actually in negative balance. At the higher intakes of 2.63 and 2.83 grams of calcium, they stored from 0.034 to 0.239 gram per kilogram. The phosphorus retention on the generous diet varied a little more widely, that is, from 0.015 to 0.32 gram per kilogram on intakes of 2.3 to 2.5 grams. On the phosphorus-poor diets, containing from 0.66 to 0.927 gram of this mineral, equilibrium was maintained in one instance but a loss occurred in the others.

In order to compare more advantageously retentions with intakes in these studies, the per kilogram intakes and retentions have been computed for all subjects in which these were not reported. It is of note that in the underweight girls no positive balances appear below the minimum values observed by Wang, that is, below 0.023 gram of calcium and 0.035 gram of phosphorus per kilogram. This does not hold true, however, for the well-nourished girls, for in 8 of the 31 calcium balances and in 16 of the 28 phosphorus balances the intakes were below these minimums and yet the calcium balances were positive in all cases and the phosphorus in all but three. Sherman and Hawley, and Burton each reported calcium retentions on intakes as low as 0.013 gram per kilo, and Kramer *et al.* reported phosphorus retention on 0.017 gram per kilogram. The majority of both calcium and phosphorus balances, however, were well above these figures.

Calcium and phosphorus intake studies

The only studies of calcium and phosphorus intake of adolescent girls on freely-chosen diets are those reported by Robert and Carl Tigerstedt (21, 22) for 25 Finnish peasant girls. These intakes range from 0.636 to 3.216 grams of calcium, and from 1.025 to 4.09 grams of phosphorus. The minimum per kilogram consumption was 0.014 gram of calcium and 0.020 gram of phosphorus by a 17-year-old girl. Values as a whole, however, were much above the intakes in any of the balances reported on girls 10 to 13 years, save for Stearns' high calcium and phosphorus diets. For 11 to 15 years the average is approximately 2.0 grams for calcium, and for 12 to 16 years, 2.5 grams or more of phosphorus. These

high intakes are explained by the large amounts of milk and cheese in the diets.

Magnesium, potassium, sulphur, iron, copper and manganese

Magnesium balance experiments have been made on boys of various ages by Herbst and his coworkers (5, 15) in Germany, and by Ahlquist (1) and Ruotsalainin (16) in Finland. The only balance reported for girls is that of Chaney and Blunt (4), who found their two subjects, 10 and 11 years of age, storing 0.150 to 0.437 gram of magnesium on intakes of 0.663 to 1.189 grams for three-day periods. The magnesium intakes of the Finnish girls observed by the Tigerstedts (21, 22) ranged from 0.41 to 1.39 grams per day for girls of 10 to 17 years.

No studies of potassium or sulphur, either balance or intake, appear to have been made for girls. Herbst's (5) early study of the mineral metabolism of seven boys, 6 to 14 years of age, for a six-day period, is therefore of interest. Expressed in terms of potassium, one normal 13-year-old boy in this study retained 0.314 gram per day on an intake of 2.52 grams, or 0.612 gram per kilogram, while two other boys in poor condition were in negative potassium balance on intakes of 1.79 and 2.30 grams, or about 0.85 gram per kilogram. The only studies of sulphur found were those on preschool children reported by Schwarz (17) in 1910.

The iron needs of children have likewise only been studied on preschool children. Three such studies are available: McKay's (11) observations of the iron intakes of a number of children 2 to 6 years of age; an iron metabolism study of one girl of two years by Rose and her coworkers (14); and a more recent balance experiment on four children 2 to 4 years of age by Leichsenring and Flor (8). Rose and her coworkers concluded from their study that 0.75 milligram of iron per 100 calories is a suitable standard for children of 2 to 3 years, while the last named workers consider the iron requirement for growth to be approximately 0.2 milligram per kilogram, or 0.62 milligram per 100 calories. Obviously, data on larger numbers of children at different ages are necessary before these estimates can be considered as standards.

No actual observations of copper or manganese needs or intakes of children have been reported, but Hodges and Peterson (6) have calculated the daily intakes of manganese, copper, and iron based on menus in Rose's *Feeding the Family*. According to this empirical suggestion, the intakes of a child of 10 years are 3.43 milligrams of manganese, 1.86 milligrams of copper, and 13.86 milligrams of iron; and for a girl of 16 years, 2.86 milligrams of manganese, 1.74 milligrams of copper, and 13.45 milligrams of iron.

MINERAL INTAKES OF GIRLS IN THIS STUDY

The mineral content of the diets of these 38 girls was computed using accepted tables of food consumption for the various raw foods. It is realized that the different samples of the same food may vary widely in their mineral content, and also that the values in the tables used are based on too few analyses. It is probable, nevertheless, that the calculated values give approximate indications of the mineral intakes. A report by Bassett, Elden, and McCann (2), in which computed results were compared with those obtained by analyses, would seem to justify this assumption, with the possible exception of calcium and sodium. The calculated content of 10 diets was 15.5 per cent lower, and that for sodium 18.5 per cent higher than that obtained by analysis, but the other minerals differed for the two methods by no more than 3.8 per cent. (P, 1.7; K, 3.8; Mg, 0.7; Fe, 0.24.) The calculated intakes for the girls of the present study are given in tables 1, 2, and 3. These tables speak for themselves, but a few comments on the levels of intakes for the different minerals and their relationships may be pertinent.

A striking feature of the calcium intakes is their relatively small variation at any age, or within the group. The range is from 0.673 to 1.377 grams, but all except three fall between 0.9 and 1.35 grams. The average intake of 1.12 grams is therefore fairly representative of the group, and is slightly above Sherman's standard of one gram per day throughout growth. The explanation of this rather consistent calcium intake is found in the milk consumption. A little more than 3.5 cups per individual per day was supplied by the institution, to be used in cooking and as a beverage, and its use was fairly evenly distributed throughout the group. This differs from the findings of the Tigerstedts (21, 22) in that the intakes of the Finnish girls were much higher and more variable, ranging from 0.626 to 3.216 grams, and averaging 1.87 grams. The greater variability in the intakes of Tigerstedts' subjects is explained by the fact that their diet was not influenced by the slogan "a quart of milk a day for every child," as is the case in this country. Milk and cheese were important foods in the diets of these peasant families, both for adults and children, and their use increased proportionately with the caloric intake. This is indicated by the coefficient of correlation of +.87 between calories and calcium.

The intakes of phosphorus showed a wider range, from 0.998 to 2.104 grams with an average of 1.425 grams. All but five intakes, however, fall between 1.0 and 1.8 grams and were relatively much lower than the

TABLE 1

Calcium and phosphorus intakes of well-nourished girls 8 to 17 years of age

GIRL	AGE		HEIGHT	WEIGHT	LENGTH OF EXPERIMENT	DAILY Ca INTAKE			DAILY P INTAKE			Ca:P RATIO
	Years	Months				Total	Per kilogram	Per centimeter	Total	Per kilogram	Per centimeter	
			cm.	*grams*	*days*	*grams*	*grams*	*grams*	*grams*	*grams*	*grams*	
C. M.	8	7	124.7	25.6	7	0.889	0.035	0.0071	1.066	0.042	0.0085	0.83:1
L. T.	8	9	124.0	26.9	7	0.981	0.037	0.0079	1.237	0.046	0.0100	0.79:1
F. H.	10	3	132.8	27.5	7	1.108	0.040	0.0083	1.346	0.049	0.0101	0.82:1
E. R.	10	3	135.9	37.3	7	1.207	0.032	0.0089	1.541	0.041	0.0116	0.78:1
R. S.	10	3	131.0	28.9	7	1.046	0.036	0.0080	1.247	0.043	0.0095	0.84:1
M. McG.	10	5	134.9	33.6	7	1.116	0.033	0.0083	1.701	0.051	0.0126	0.66:1
A. F.	10	9	143.0	37.1	7	1.281	0.035	0.0090	1.789	0.048	0.0124	0.72:1
E. G.	10	9	132.1	30.5	7	1.016	0.033	0.0077	1.154	0.038	0.0087	0.88:1
B. W.	10	9	129.5	30.0	7	1.094	0.037	0.0084	1.267	0.042	0.0098	0.86:1
A. G.	11	0	138.4	37.9	7	1.038	0.027	0.0075	1.348	0.036	0.0097	0.77:1
O. M. D.	11	3	139.7	36.7	6	0.978	0.027	0.0070	1.309	0.036	0.0086	0.75:1
A. R.	11	4	138.2	37.0	7	1.050	0.028	0.0076	1.276	0.035	0.0092	0.82:1
E. B.	12	5	148.6	48.5	7	0.942	0.019	0.0063	1.203	0.025	0.0081	0.78:1
C. G.	12	5	146.8	38.8	7	1.135	0.029	0.0077	1.395	0.036	0.0095	0.81:1
M. F.	12	6	146.8	36.3	7	1.322	0.036	0.0090	1.687	0.047	0.0115	0.78:1
E. S.	12	7	155.2	46.6	7	1.349	0.029	0.0087	1.777	0.038	0.0121	0.76:1
D. H.	12	10	140.5	38.6	7	1.239	0.032	0.0088	1.561	0.040	0.0111	0.79:1
R. P.	12	10	151.1	42.8	7	1.131	0.026	0.0075	1.228	0.029	0.0081	0.92:1
S. S.	12	10	151.9	47.5	7	1.060	0.022	0.0070	1.279	0.027	0.0084	0.83:1
G. P.	12	11	150.1	53.9	7	1.301	0.024	0.0087	1.499	0.028	0.0100	0.87:1
F. W.	12	11	143.0	44.4	7	1.000	0.023	0.0070	1.209	0.027	0.0085	0.83:1
L. H.	13	3	157.7	53.9	7	1.219	0.023	0.0077	1.537	0.029	0.0098	0.79:1
V. S.	13	4	167.1	56.3	7	1.220	0.022	0.0073	1.496	0.027	0.0090	0.82:1
K. S.	13	10	160.7	51.1	7	1.349	0.026	0.0084	1.655	0.032	0.0103	0.82:1
M. R.	13	11	158.7	42.9	7	1.278	0.030	0.0081	2.102	0.049	0.0133	0.60:1
M. St.	14	0	161.0	55.8	7	0.938	0.017	0.0058	1.216	0.022	0.0076	0.77:1
M. S.	14	2	150.1	52.7	7	0.871	0.017	0.0058	1.072	0.020	0.0071	0.81:1
N. M.	14	5	161.3	61.2	7	1.331	0.022	0.0083	2.044	0.033	0.0127	0.65:1
J. K.	14	7	158.7	61.0	7	1.137	0.019	0.0072	1.346	0.022	0.0085	0.84:1
V. F.	14	8	158.2	51.4	7	1.377	0.027	0.0087	1.873	0.036	0.0118	0.74:1
M. Hi.	14	10	167.1	67.5	7	1.354	0.020	0.0081	2.104	0.031	0.0126	0.64:1
G. D.	15	1	160.8	55.6	7	1.064	0.019	0.0066	1.240	0.023	0.0077	0.86:1
J. D. M.	15	7	154.4	51.0	6	0.927	0.018	0.0060	1.052	0.021	0.0068	0.88:1
J. R.	16	0	152.7	51.5	6	1.212	0.024	0.0080	1.377	0.027	0.0090	0.88:1
G. W.	16	4	157.0	64.0	5	1.245	0.020	0.0079	1.585	0.025	0.0101	0.79:1
D. W.	16	4	164.6	59.8	5	0.673	0.011	0.0041	0.998	0.017	0.0061	0.67:1
M. G.	16	9	161.3	59.0	6	0.940	0.016	0.0058	1.062	0.018	0.0066	0.89:1
O. S.	17	0	163.8	54.5	7	1.078	0.020	0.0066	1.269	0.023	0.0078	0.86:1
Mean						1.118	0.026	0.0075	1.425	0.033	0.0096	0.79:1

TABLE 2

Magnesium, potassium, and sulphur intakes of well-nourished girls 8 to 17 years of age

GIRL	AGE	DAILY Mg INTAKE			DAILY K INTAKE			DAILY S INTAKE			N:S RATIO
		Total	Per kilogram	Per centimeter	Total	Per kilogram	Per centimeter	Total	Per kilogram	Per centimeter	
	years	*grams*	*grams*	*grams*	*grams*	*grams*	*grams*	*grams*	*grams*	*grams*	
C. M.	8	0.221	0.0086	0.0018	2.118	0.083	0.017	0.635	0.025	0.0051	16:1.23
L. T.	8	0.290	0.0108	0.0023	2.830	0.105	0.023	0.676	0.025	0.0055	16:1.24
F. H.	10	0.314	0.0114	0.0024	2.982	0.108	0.023	0.720	0.026	0.0054	16:1.11
E. R.	10	0.402	0.0108	0.0030	3.337	0.090	0.025	0.892	0.024	0.0066	16:1.19
R. S.	10	0.222	0.0077	0.0017	2.237	0.077	0.017	0.637	0.022	0.0048	16:1.23
M. McG.	10	0.371	0.0110	0.0028	3.100	0.092	0.023	0.790	0.024	0.0059	16:1.12
A. F.	10	0.509	0.0137	0.0036	3.425	0.092	0.024	1.105	0.030	0.0077	16:1.26
E. G.	10	0.215	0.0070	0.0016	2.039	0.067	0.015	0.750	0.025	0.0057	16:1.30
B. W.	10	0.257	0.0086	0.0020	2.302	0.077	0.018	0.954	0.033	0.0074	16:1.55
A. G.	11	0.328	0.0087	0.0024	3.078	0.081	0.022	0.774	0.020	0.0056	16:1.25
O. D. M.	11	0.329	0.0090	0.0024	3.077	0.084	0.022	0.745	0.020	0.0053	16:1.31
A. R.	11	0.285	0.0077	0.0021	2.632	0.071	0.019	0.846	0.023	0.0061	16:1.31
E. B.	12	0.245	0.0051	0.0016	2.012	0.042	0.014	0.827	0.017	0.0056	16:1.31
C. G.	12	0.317	0.0082	0.0022	2.929	0.076	0.020	0.779	0.020	0.0053	16:1.13
M. F.	12	0.387	0.0107	0.0026	3.777	0.104	0.026	1.012	0.028	0.0069	16:1.17
E. S.	12	0.396	0.0085	0.0026	3.568	0.077	0.023	1.004	0.022	0.0065	16:1.16
D. H.	12	0.330	0.0085	0.0023	3.143	0.081	0.022	0.874	0.023	0.0062	16:1.17
R. P.	12	0.251	0.0059	0.0017	2.546	0.060	0.017	0.774	0.018	0.0051	16:1.33
S. S.	12	0.258	0.0054	0.0017	2.401	0.051	0.016	0.856	0.018	0.0056	16:1.39
G. P.	12	0.275	0.0051	0.0018	2.600	0.048	0.017	0.987	0.018	0.0066	16:1.31
F. W.	12	0.252	0.0057	0.0018	2.189	0.049	0.015	0.743	0.017	0.0052	16:1.20
L. H.	13	0.344	0.0064	0.0022	3.223	0.069	0.020	0.921	0.017	0.0058	16:1.25
V. S.	13	0.314	0.0056	0.0019	2.851	0.051	0.017	0.988	0.018	0.0059	16:1.30
K. S.	13	0.390	0.0076	0.0024	3.552	0.070	0.022	1.009	0.020	0.0063	16:1.25
M. R.	13	0.383	0.0089	0.0024	3.156	0.074	0.020	0.984	0.023	0.0062	16:1.15
M. St.	14	0.277	0.0050	0.0017	2.615	0.047	0.016	0.723	0.013	0.0045	16:1.22
M. S.	14	0.218	0.0041	0.0015	2.166	0.041	0.014	0.764	0.014	0.0051	16:1.40
N. M.	14	0.420	0.0069	0.0026	3.529	0.058	0.022	1.006	0.016	0.0062	16:1.10
J. K.	14	0.277	0.0044	0.0017	2.618	0.043	0.017	0.865	0.014	0.0055	16:1.32
V. F.	14	0.436	0.0085	0.0028	3.981	0.077	0.025	1.066	0.021	0.0067	16:1.19
M. H.	14	0.491	0.0073	0.0029	4.143	0.061	0.025	1.177	0.017	0.0070	16:1.22
G. D.	15	0.251	0.0045	0.0016	2.457	0.044	0.015	0.866	0.016	0.0054	16:1.35
J. D. M.	15	0.213	0.0042	0.0014	2.051	0.040	0.013	0.688	0.013	0.0045	16:1.34
J. R.	16	0.319	0.0062	0.0021	2.710	0.053	0.018	1.010	0.020	0.0066	16:1.48
G. W.	16	0.358	0.0056	0.0023	3.159	0.049	0.020	0.937	0.015	0.0060	16:1.22
D. W.	16	0.228	0.0038	0.0014	2.169	0.036	0.013	0.815	0.014	0.0050	16:1.45
N. G.	16	0.253	0.0043	0.0016	2.483	0.042	0.015	0.860	0.015	0.0053	16:1.38
O. S.	17	0.255	0.0047	0.0016	2.506	0.046	0.015	0.925	0.017	0.0056	16:1.47
Mean.....		0.313	0.0073	0.0021	2.834	0.066	0.019	0.871	0.020	0.0058	16:1.27

TABLE 3

Iron, copper, and manganese intakes of well-nourished girls 8 to 17 years of age

GIRL	AGE	DAILY Fe INTAKE			DAILY Cu INTAKE			DAILY Mn INTAKE		
		Total	Per kilogram	Per centimeter	Total	Per kilogram	Per centimeter	Total	Per kilogram	Per centimeter
	years	*mgm.*	*mgm.*	*mgm.*	*mgm.*	*mgm.*	*mgm.*	*mgm.*	*mgm.*	*mgm.*
C. M.	8	7.9	0.31	0.060	1.34	0.052	0.011	2.90	0.113	0.023
L. T.	8	10.0	0.37	0.080	1.48	0.055	0.012	2.51	0.093	0.020
F. H.	10	10.7	0.39	0.081	1.60	0.058	0.012	2.69	0.098	0.020
E. R.	10	16.3	0.44	0.120	1.80	0.048	0.013	3.83	0.103	0.028
R. S.	10	7.4	0.25	0.056	1.14	0.040	0.009	1.59	0.055	0.012
M. McG.	10	13.0	0.39	0.096	1.66	0.049	0.012	3.02	0.090	0.022
A. F.	10	15.8	0.43	0.110	1.84	0.050	0.013	3.52	0.095	0.025
E. G.	10	7.2	0.24	0.055	1.21	0.040	0.009	2.84	0.093	0.021
B. W.	10	10.0	0.33	0.077	1.55	0.052	0.012	2.69	0.090	0.021
A. G.	10	11.4	0.30	0.083	1.88	0.050	0.014	3.17	0.084	0.023
O. M. D.	11	11.1	0.30	0.080	1.73	0.047	0.012	2.98	0.081	0.021
A. R.	11	10.8	0.29	0.078	1.64	0.044	0.012	3.54	0.096	0.026
E. B.	12	8.4	0.17	0.057	1.39	0.029	0.009	4.13	0.085	0.028
C. G.	12	11.5	0.30	0.078	1.77	0.046	0.012	3.19	0.082	0.022
M. F.	12	17.9	0.49	0.122	2.01	0.055	0.014	4.56	0.126	0.031
E. S.	12	17.1	0.37	0.110	1.95	0.042	0.013	3.88	0.083	0.025
D. H.	12	14.5	0.38	0.103	1.77	0.046	0.013	3.55	0.092	0.025
R. P.	12	9.1	0.21	0.060	1.34	0.031	0.009	2.19	0.051	0.014
S. S.	12	9.1	0.19	0.060	1.44	0.030	0.009	3.33	0.070	0.022
G. P.	12	12.2	0.23	0.081	1.56	0.029	0.010	2.89	0.054	0.019
F. W.	12	8.6	0.19	0.060	1.46	0.033	0.010	3.47	0.078	0.024
L. H.	13	12.6	0.23	0.080	1.90	0.035	0.012	3.00	0.056	0.019
V. S.	13	12.3	0.22	0.073	1.76	0.031	0.011	4.46	0.079	0.027
K. S.	13	15.9	0.31	0.099	2.23	0.044	0.014	3.37	0.066	0.021
M. R.	13	15.6	0.36	0.098	1.98	0.046	0.013	4.42	0.103	0.028
M. St.	14	10.6	0.19	0.066	1.49	0.027	0.009	2.72	0.049	0.017
M. S.	14	9.4	0.18	0.063	1.30	0.025	0.009	2.28	0.043	0.015
N. M.	14	17.1	0.28	0.106	2.02	0.033	0.013	4.46	0.073	0.028
J. K.	14	9.3	0.15	0.059	1.55	0.025	0.010	3.77	0.062	0.024
V. F.	14	18.0	0.35	0.114	2.17	0.042	0.014	5.05	0.098	0.032
M. H.	14	19.7	0.29	0.118	2.21	0.033	0.013	4.39	0.065	0.025
G. D.	15	11.0	0.20	0.069	1.54	0.028	0.010	3.37	0.060	0.021
J. D. M.	15	7.1	0.14	0.046	1.17	0.023	0.008	2.24	0.044	0.015
J. R.	16	9.8	0.19	0.064	1.72	0.033	0.011	3.39	0.066	0.022
G. W.	16	14.8	0.23	0.094	1.74	0.027	0.011	4.61	0.072	0.029
D. W.	16	9.1	0.15	0.055	1.45	0.024	0.009	3.45	0.058	0.021
N. G.	16	8.7	0.15	0.054	1.57	0.027	0.010	2.95	0.050	0.018
O. S.	17	9.4	0.17	0.057	1.46	0.027	0.009	3.01	0.055	0.018
Mean.....		11.9	0.27	0.082	1.66	0.038	0.011	3.35	0.077	0.022

phosphorus intakes reported by the Tigerstedts. The relation to calories was relatively high, $r = +.87$, but was even still higher when related to protein intake, $r = +.93$.

The per kilogram intakes of phosphorus range from 0.017 to 0.051 gram, and average 0.033 gram; those for calcium range from 0.011 to 0.040 gram, averaging 0.026 gram. These averages do not greatly differ from the minimum amounts, 0.35 and 0.023 gram respectively, on which Wang (26) found that her girls stored these elements. It should be noted, however, that Wang's subjects were younger and that the girls of the same ages (8 to 12 years) in this study consumed less than these amounts in but a few instances.

The Ca:P ratios range from 0.60:1 to 0.92:1, but the great majority of cases, 75 per cent, fall within the range of 0.75:1 and 0.90:1. These are similar to the ratios found in the American studies reported, but those of the Tigerstedts tend to be lower and to show a much wider range of variation.

The total magnesium intakes of the group were low as compared with both calcium and phosphorus, ranging from 0.213 to 0.509 gram with an average of 0.313 gram, while the potassium intakes were relatively high the range being from 2.051 to 4.143 grams and the mean intake 2.8 grams —the highest average for any mineral studied. The magnesium intakes of these girls were much lower than those observed by the Tigerstedts for Finnish girls of the same ages (0.41 to 1.39 grams), and were comparable to those on which Chaney and Blunt's (4) two girls were storing magnesium. Most of the potassium values were above those on which Herbst's (5) normal boy was in positive balance. The intakes of both magnesium and potassium were closely related to calories and also to protein, the coefficients of correlation being +.85 and +.83, respectively, in the first instance, and +.90 and +.85 in the second.

The sulphur intakes varied widely, though relatively less than the magnesium and potassium. The range was from 0.635 to 1.177 and the mean 0.871 grams. It is generally assumed that if the protein of a diet is sufficient, adequate sulphur intake is assured. The basis for this is that organic sulphur, which Lewis has shown to be the only form utilized by the animal organism, occurs in foods largely as a part of the cysteine molecule, and most proteins are found to contain about 1 part of sulphur to 16 parts of nitrogen. In the present study the relation between protein and sulphur was relatively high, the value for r being +.86, while that for sulphur and calories was but +.71. The close relation between sulphur and protein was further shown by the N:S ratios which averaged 16:1.27 and varied only from 16:1 to 16:1.48 for the group.

The iron intakes, likewise, showed great variation, ranging from a minimum of 7.1 to 19.7 milligrams, the mean being 11.9 milligrams. The mean intake per 100 calories was 0.51 milligrams, a lower amount than the allowances of Rose (0.75 milligrams per 100 calories) and of Leichsenring and Flor (0.62 milligrams per 100 calories), although not greatly differing from the actual amounts on which retentions were obtained by both these workers. The high correlation found between iron and protein intake ($r = +.92$) seems rather surprising. (The iron values were computed both from Sherman's (18) and Elvehjem's (12) figures. The former are given in table 3. The mean values were 4.5 per cent higher when the tables of the Wisconsin workers were used.)

Copper and manganese were present in the diets in small amounts, the copper ranging from 1.14 to 2.23 milligrams and averaging 1.66 milligrams, while the manganese ranged from 1.59 to 5.05 milligrams, with a mean of 3.35 milligrams. (Calculations were based on percentages of these minerals in foods as given by Lindow, Elvehjem, and Peterson (10), and by Peterson and Skinner (13).

The relationship between the intakes of each of the eight minerals studied, and various pertinent factors, have been computed. The results are recorded in table 4. It is noted that all intakes bear a fairly high relation to total calories, the highest being phosphorus, magnesium, potassium, iron, and copper with r's of $+.83$ to $+.87$, the lowest sulphur and manganese with r's of $+.71$ and $+.63$. A still closer relationship to protein is indicated, however, by the values for r which range from $+.93$ for phosphorus, to $+.77$ for manganese and protein. In case of copper the value for r, $+.87$, is the same for calories and for protein. When these minerals are considered in relation to the usual predictive bases—age, weight, height, and their various combinations—it is seen that, as in the case of both calories and protein, the r's are relatively low for the single factors of age, weight, and height. Sulphur showed the highest relationships with these three factors, with manganese and copper next in order. The relation of each mineral to height was closer than to either weight or age. Consistent with the findings for calories and protein, a closer relation was found for each mineral with a combination of two factors, as weight and age, and weight and height, than with either alone, the r's for the former ranging from $-.63$ to $-.77$, with similar results for the latter. In view of this fairly high relationship, a table giving the smoothed values for per kilogram intakes by age is included here (table 6). Again, as found with calories and protein, little or no correlation appears to exist between the intake of these minerals, per centimeter of height, and the age of the girl.

TABLE 4

Coefficients of correlation from various analyses of total mineral intakes

MINERAL	CALORIES	PROTEIN	AGE	WEIGHT	HEIGHT
Ca	+.80 ±.04	+.85 ±.03	+.03 ±.11	+.18 ±.11	+.27 ±.10
P	+.87 ±.03	+.93 ±.02	+.03 ±.11	+.21 ±.11	+.30 ±.10
Mg	+.85 ±.03	+.90 ±.02	+.01 ±.11	+.16 ±.11	+.22 ±.10
K	+.83 ±.03	+.85 ±.03	+.02 ±.11	+.15 ±.11	+.24 ±.10
S	+.71 ±.03	+.86 ±.03	+.36 ±.10	+.49 ±.08	+.55 ±.08
Fe	+.84 ±.03	+.92 ±.02	+.05 ±.11	+.24 ±.10	+.32 ±.10
Cu	+.87 ±.03	+.87 ±.03	+.11 ±.11	+.26 ±.11	+.36 ±.10
Mn	+.63 ±.04	+.77 ±.05	+.25 ±.10	+.45 ±.09	+.46 ±.09

TABLE 5

Coefficients of correlation from various analyses of mineral intakes per unit of weight and of height

MINERAL	INTAKE PER KILO WITH		INTAKE PER CENTIMETER WITH AGE
	Age	Height	
Ca	−.82 ±.04	−.75 ±.05	−.48 ±.09
P	−.76 ±.05	−.65 ±.06	−.33 ±.10
Mg	−.71 ±.05	−.61 ±.07	−.32 ±.10
K	−.75 ±.04	−.65 ±.06	−.36 ±.10
S	−.72 ±.05	−.67 ±.06	−.11 ±.11
Fe	−.60 ±.07	−.45 ±.09	−.18 ±.11
Cu	−.79 ±.04	−.73 ±.05	−.28 ±.10
Mn	−.63 ±.07	−.58 ±.07	−.02 ±.11

TABLE 6

Smoothed values for per kilogram intakes of minerals by age

AGE	NUMBER OF GIRLS	Ca	P	Mg	K	S	Fe	Cu	Mn
		grams	*grams*	*grams*	*grams*	*grams*	*mgm.*	*mgm.*	*mgm.*
10	7	0.035	0.044	0.0100	0.085	0.026	0.35	0.048	0.090
11	3	0.032	0.040	0.0090	0.075	0.023	0.32	0.045	0.085
12	9	0.029	0.036	0.0080	0.065	0.020	0.29	0.041	0.080
13	4	0.026	0.032	0.0070	0.060	0.018	0.26	0.037	0.075
14	6	0.023	0.028	0.0060	0.055	0.017	0.23	0.033	0.070
15	2	0.020	0.025	0.0055	0.050	0.016	0.20	0.030	0.065
16	4	0.018	0.022	0.0050	0.045	0.015	0.18	0.027	0.065
Average.....		0.026	0.033	0.0073	0.066	0.020	0.27	0.038	0.077

Unfortunately, it is impossible to say, solely on the basis of intakes, whether these amounts are either adequate or in excess of needs, or whether the gradual decrease with age is in accord with physiological demands or merely an indication that the mineral-containing foods are provided in relatively larger amounts in the earlier years. These average intakes are, however, in most cases equal to, or in excess of the amounts on which retentions have been obtained in the few studies that are available for comparison. Complete balance studies for the various ages are needed before the true requirements of the various minerals can be established.

SUMMARY

1. The mineral intakes of 38 healthy, well-nourished adolescent girls have been observed; these included calcium, phosphorus, magnesium, potassium, sulphur, iron, copper, and manganese.

2. Considerable individual differences occurred in total consumption of all these minerals, with exception of calcium intakes which were less variable.

3. The average daily intakes of the whole group were approximately 1.1 grams of calcium, 1.4 grams of phosphorus, 0.3 gram of magnesium, 2.8 grams of potassium, 0.9 gram of sulphur, 11.9 milligrams of iron, 1.7 milligrams of copper, and 3.4 milligrams of manganese.

4. Seventy-five per cent of the Ca:P ratios fall within the range of 0.75:1 to 0.90:1.

5. The mineral intakes varied quite closely with the calorie intake, with exception of sulphur and manganese in which instances only a fair correlation was apparent. A still closer relationship was found with protein intake, particularly in the case of sulphur, iron, and phosphorus. The mean N:S: ratio was 16:1.27.

6. Little or no correlation was apparent between the total intake of any of these minerals and the age, weight, or height of the girls, or between their per centimeter intake and age; while in each case a fair correlationship was found for the intake per kilogram with age and with height.

7. These data are too limited for the findings to be used in the formulation of definite standards for the mineral requirements of adolescent girls. Smoothed curves of the intakes per kilogram per age are suggested, however, as tentative minimum standards to be used until more data are available.

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EDITORIAL

Milk—Processed and Raw

A symposium might well be held on the subject of teaching charity cases to use evaporated milk. One welfare organization reports that one quart of pasteurized milk for each child under a year, a pint for each child from one year to sixteen years (not to exceed three quarts) is sent to each family registered with them, in addition to a grocery order and a box of staples. Every box of staples includes from six to eleven cans of evaporated milk, depending on the size of the family. It took the combined efforts of a number of dietitians to keep that amount of milk from being reduced. Social workers insisted that it was not being used; nutritionists maintained that people had to learn. Just as in other social strata, some of these families would use it extensively and others would rather have no milk at all. In teaching foreigners the use of evaporated milk, the response is reported to be varied. Although Poles use a great deal of milk in cooking, their ideas on food are definite and they consider canned milk cream, not milk. Italians use little milk in cooking and are for the most part averse to canned foods. One Italian woman was complaining bitterly that she did not have enough milk. Investigation proved that she was selling the milk she received regularly, since she did not know how to use it.

In spite of the countless arguments in its favor by noted investigators, certain women prominent in charitable work cling to the belief that despite all the favorable comment it will not be many years before investigators will discover evaporated milk to be harmful. Many nurses associate any milk out of a can with sweetened condensed milk and shudder when it is mentioned. Many doctors as well are prejudiced against its use, while dietitians have been known to criticize adversely projects in low cost diets because evaporated milk was used exclusively.

A survey conducted by workers of the United States Public Health Service was carried out last year among young children in a number of cities in 10 different states. Those children who had had raw milk during at least half of their lives were placed in the raw-milk group, and those who had received heated milk (including pasteurized milk, boiled milk, evaporated milk and milk powder) were placed in the heated-milk group. The study included more than 3700 children. No significant differences in average weight and height were found. A lower incidence of rickets in the heated-milk group was considered attributable to the greater cod-liver oil intake of this group. Only three cases of scurvy were reported,

two for the heated-milk group and one for the raw-milk group. The incidence of diphtheria among the heated-milk group was 17.1 per thousand; among the raw-milk group it was 22.7 per thousand. The incidence of scarlet fever in the former was 23.0 per thousand, as compared with an incidence of 41.4 per thousand in the raw-milk group. Excluding diarrhea, the incidence of intestinal disturbances in the heated-milk group was 111.0 per thousand, compared with an incidence of 196.0 per thousand in the raw-milk group.

This survey leads to the conclusion that the growth-promoting capacity of heated milk, plus the supplementary diet received by the average American child of 10 months to 6 years, is not measurably less than the growth-promoting capacity of raw milk plus a similar supplementary diet.

A recent contribution to the literature has been Tobey's review of 25 clinical studies on the use of evaporated, powdered, and condensed milks in infant feeding. About 3800 infants were included in these investigations, 2700 of whom were given evaporated milk formulas, 600 of whom were on powdered milk modifications, and 500 on condensed milk. In addition to these 25 studies, Tobey states that during the past four years about 75 articles have appeared, directly or indirectly bearing upon the subject of powdered or dried milks, 43 articles on evaporated milk, and 12 on condensed milk. In the summary of his review appearing in the March, 1933, *Archives of Pediatrics*, he states "A review of the various investigations reveals that these processed milks not only have no disadvantages, but possess certain distinct qualities which justify their present vogue. No adverse findings have been reported."

The Correlation of Diabetes with Other Diseases

In 1932 the *Weekly Bulletin* of the Department of Health of the City of New York cited Banyai's study published in the *American Review of Tuberculosis*, to the effect that tuberculosis occurs about three times more frequently among diabetics than among the general population of the United States. In the same publication Rubin gave an analysis of 414 patients past fifty years of age treated in the Tuberculosis Division of the Montefiore Hospital. Among these 414 patients there were no less than 72 (17 per cent) who had diabetes and pulmonary tuberculosis. This is a very high degree of association, but it must be remembered that the hospital is a Jewish institution, and diabetes is very prevalent among Jews. Further light on the association between diabetes and tuberculosis may be obtained by studying the figures of the Health Department's

register for 1930 and 1931. The average incidence of pulmonary tuberculosis among the diabetes deaths, in persons 45 years and over, during the two years 1930 and 1931, was, among males, 18.5; among females, 23. These figures, however, include only deaths among the diabetics; in reality, cases should be used. This computation, also, would yield a higher association between diabetes and tuberculosis than could be accounted for by chance.

In addition, there is a well known correlation between diabetes and cardio-arterio-renal disease, which is clearly apparent from the report of the Health Department. It will be noted that of 1921 deaths of diabetes, 977 were complicated with cardio-arterio-renal disease. This is nearly 51 per cent. If we limit the cases to deaths of persons 55 years of age and over, we have 1431 diabetes deaths complicated in 819 instances by cardio-arterio-renal disease. This is over 57 per cent.

There are 2000 deaths in New York City annually, directly attributed to diabetes, the deaths among females being double those among males. Most of the deaths occur in persons over forty-five years of age, and in these the death rate from diabetes is increasing.

CURRENT COMMENT

An Experimental Kitchen in a Modern Hotel

In a radio talk from the National Broadcasting Company studios, Marie Casteen, who is in charge of the experimental kitchen and promotion of American cookery of the Hotels Statler Company, told of the development of her work in catering to the clientele of a high class hotel in answer to demands for food prepared with the "home touch." There are seven hotels in the Hotels Statler system, each with three to seven types of restaurant, that serve on an average of fifteen to twenty thousand people a day. Dishes appearing on the menus must be sufficiently diversified to appeal to the following varying groups: (1) the higher-salaried business men and women; (2) women shoppers; (3) matinee or bridge parties; (4) out-of-town visitors, frequently the entire family, who seldom eat in hotel restaurants and appreciate something different from that which they have at home; (5) commercial travelers, many of whom still prefer the older type of hotel food; and (6) members of business-organization luncheon clubs.

One of the first steps in answer to the demand for foods with the American home appeal was the installation by Mr. Hennessy, the catering manager, of an experimental kitchen on the eighteenth floor of the

Pennsylvania Hotel in New York City. Marie Casteen was placed in charge and faced with the problem of devising methods for producing characteristic American dishes such as apple pie, brown betty, apple cobbler, peach tapioca, floating island, hot gingerbread with whipped cream, and apple pan-dowdy, in amounts adequate to feed several hundred people. The final product in each case was to have that characteristic home appearance and flavor produced by the average competent housewife. It was found that the best means of developing the idea of home cooking was to employ and train women cooks. One of the first women on this small kitchen force five years ago is now in charge of the pastry shop and also supervises the preparation and service of vegetables. Certain hot breads were specialized in, one woman cook being assigned to their preparation. Attention was then given to luncheon entrées, in developing lighter combinations such as attractive fish combinations or egg dishes, vegetable entrées and salad combinations.

During the course of Miss Casteen's experience with the various units of this hotel system over the United States, it was found that tastes varied considerably. In the West there seemed to be a preference for heavier food and larger portions, while upper New York State might prefer vegetable combinations. However, it was found that if a given dish was delicious in flavor, well prepared and served, it appealed to guests of the widely scattered hotels.

There are certain characteristic likes and dislikes. For instance, the American public seems to enjoy the natural flavor of a given food. They do not care so much for sauces, but prefer gravy made from the juices and drippings of the meat being served. Vegetables must have their original flavor retained. The seasonings must be simple and little added other than salt, pepper, butter, or cream. It is Miss Casteen's impression that there is not a great difference between the food liked by men as compared with the food which women prefer. She believes that it is a question of environment and occupation, rather than sex, which determines the amounts and kinds of food which people will eat. Miss Casteen stated that most of her recipes for strictly American dishes are obtained from housewives, and magazines and newspapers in which the recipes are largely sent in by the readers. According to many women who have been successful in large scale commercial food production, experience in actually managing and catering to a home group has been of greatest help in their later work.

Food Costs at the Neurological Institute

This year, when hospital receipts have been greatly diminished, it is gratifying to know with what efficiency Ruth Bigelow, chief dietitian, has been able to cut the per capita cost of the raw food purchased for the Neurological Institute of the Medical Center, New York City, in spite of the large reduction in bed occupancy, chiefly due to a decrease in the number of private patients. The per capita, per meal, raw food cost for the first four months of the past four years was as follows:

	January	*February*	*March*	*April*
1930	$.21	$.21	$.23	$.22
1931	.18	.20	.18	.20
1932	.16	.14	.15	.15
1933	.14	.13	.13	.12

Since April, 1929, when the new building at the Medical Center was opened, every effort has been made to have the food and food service meet the high standards of the Institute in general. Especial attention has been given to the mental foibles of the patients, as well as to their physical ills.

So far this year there has been a reduction of twenty-nine per cent in the number fed, compared with three years ago. At the same time there has been a forty-one per cent cut in the per capita expenditure for raw food while maintaining the previous high standard of meals. The chief changes necessitated in cutting costs have been the use of less chicken and roast beef each week, while fresh fruits and vegetables are being more generally used. Through April the amount spent this year for edibles is eighty per cent of the food allowance included in the budget. Those interested in the welfare of the Institute and its patients are therefore justly pleased with the capable manner in which the food department executive has contributed to the financial readjustment necessitated by present conditions.

A particularly interesting fact, according to Emily Timlow of the Neurological Institute's House Committee, is that the average per capita cost of raw food, as well as the per capita charge of salaries in the food department for the first four months of 1933, is less than half a cent more per person than the per capita cost of raw food alone for the first four months of 1930.

The American Institute of Nutrition

This institute was formed and incorporated under the education laws of the State of New York, September 27, 1928, for the purpose of "dis-

seminating scientific knowledge regarding nutrition by the publication of a Journal devoted to the science and in such other ways as may be approved from time to time by vote of its members." At a meeting held in Cincinnati, Ohio, April 11, 1933, in connection with the meeting of the Federation of American Societies of Experimental Biology, it was voted to enlarge the membership of the Institute for the following purposes:

1. To advance still further the standards of professional workers in nutrition and to afford recognition of research accomplishments in this field.

2. To secure support and encouragement for nutrition as an independent subject in medical schools, agricultural colleges, and other university relationships, and to secure recognition from research foundations.

3. To bring together research workers in nutrition from different kinds of institutions in occasional meetings for the exchange of views and the reading of papers.

4. To secure additional support for the *Journal of Nutrition* thereby enabling it to expand publication facilities for strictly nutritional papers.

Low Cost Menus for College Students

According to the *New York Times* for April 28, Dr. Mary S. Rose of Teachers College, Columbia University, has planned menus by which students may be adequately fed for fifty cents a day. Students would, according to the plan, eat breakfast and supper in their rooms, buying their luncheon in a cafeteria. Various menus for men and women were given. Dr. Rose emphasized that such low cost menus, at which hot food would be eaten only once a day, and from which meat, by reason of its cost, would be almost totally excluded, were for emergency purposes. While the menus include only minimum essentials, many students would find that they felt better and could accomplish more on this diet than they can on their present more expensive meals. For a woman's breakfast in her room Dr. Rose suggested a pint of milk, a shredded wheat biscuit, an orange, and a tablespoon of sugar, all to total about nine cents.

BOOK REVIEWS

The Vitamins in Health and Disease. By Barnett Sure, Ph.D. Baltimore: Williams & Wilkins, 1933, pp. 205. Price $2.00.

Dr. Sure, who is Professor of Agricultural Chemistry at the University of Arkansas, and who has done conspicuous work in the field of vitamin research, has made a valuable contribution in this recently published book. He has here presented authoritative information regarding the engrossing subject of vitamins, in readily comprehensible form, which should appeal to readers other than those well versed in advanced chemistry. Where technical language appears, explanatory footnotes are carried. Clinical evidence is presented concerning the connection between vitamins and milk secretion, infant nutrition, growth, appetite and the teeth. The vitamin content of foodstuffs is emphasized, and specific recommendations are offered on how to insure maximum vitamin content in the diet. In his introduction the author states that the book was written with a view to its suitability as a text for nutrition courses in junior and senior colleges "for students without any chemistry, or insufficient preparation in this field." He also suggests its use for medical practitioners as an aid in treating patients suffering from dietary deficiency diseases; to dietitians and nurses; and the housewife who wishes to plan wisely her daily menus. Tables covering the vitamin content of foodstuffs, largely based on material previously appearing in the *Biochemical Journal*, are included. The book may be recommended as a concise yet complete source of practical information on the subject of vitamins.

M. P. H.

Compilation of Diets. By the California Dietetic Association. Gardena: Spanish American Institute Press, 1932, pp. 129. Price $5.00.

This publication is in loose leaf form with a leatherette binder. It is kept up to date by the addition of new material from time to time, and pages of special interest may be secured in any quantity. The table of contents shows a wide variety and excellent choice of material of interest to the physician, the nurse, and the dietitian. Discussions of foods and normal diets, and special diets for all diseases in which the dietary treatment is an important factor in a favorable prognosis are included. Food values of average portions, approximate food values of 100 gram portions, compositions of canned fruits and vegetables, a vitamin distribution table on a single page, protein and salt food tables with household measures, and calculated high calorie recipes furnish data for the easy translation of written prescriptions into tray servings. These tables and others on calcium, iron, and sodium chloride in foods, together with the Physician's Dietary Information Sheet, are important aids in the writing of such prescriptions.

Diets for the investigation of the diseases of metabolism and the treatment of abnormal conditions are quoted from many sources. Among these are diets for: colitis, diabetes, epilepsy, gall bladder disease, gastric ulcer, nephritis, obesity, and pernicious anemia. Many sample menus and diet lists are given in quantitative forms and lists of equivalent values of foods that may be substituted for standard portions of other foods supplement further these aids to rapid dietary calculations.

The Compilation of Diets is in use in many hospitals in America and in foreign countries. Its wide distribution among physicians gives proof that its form is suited to rapid reading. It should find a place in the library of every dietitian and it will be a valuable addition to the reference list for University classes in dietetics. (This book may be ordered from

the Dietetic Department of the California Lutheran Hospital, Los Angeles, California.)

HELEN B. THOMPSON, PH.D.

Egg, Wheat or Milk-Free Diets. By Ray M. Balyeat, M.A., M.D., F.A.C.P., assisted by Elmer M. Busten, M.B., M.D., and Ralph Bowen, B.A., M.D. Philadelphia: J. B. Lippincott Company, 1933, pp. 149. Price $2.50.

The authors have written this volume with a view to "assisting physicians and dietitians in the selection of food lists and menus for wheat, egg or milk sensitive patients, and to make easier the task of those who actually prepare their diets." They have supplemented their own experiences with information from such notable authorities as Rowe, Vaughan and Stewart. Lists of foods and "made dishes," in which wheat, eggs, or milk are ingredients, are noted, and numerous recipes given for dishes in which these three common offenders are omitted. The various ramifications of allergic conditions are detailed. Methods of testing for food sensitization are given and the various types of food-sensitive patients are discussed. The recipes are arranged in a unique and pleasing manner. Directions are given for the administration of elimination diets, and the book concludes with charts to assist the allergic patient in keeping a food diary.

M. P. H.

Dining Room Management for Head Waitresses and Hostesses. By J. O. Dahl. New York: J. O. Dahl, 1933, pp. 42. Price $.50.

This is one of Mr. Dahl's series of "Little Gold Business Books," and appears to be a very useful manual for those to whom it is addressed.

CURRENT LITERATURE

KATHLEEN M. LEWIS

American Journal Diseases of Children

Vol. 45, May, 1933

* Vitamin A content of milk irradiated by various carbon arcs. R. C. Bender and G. C. Supplee.—p. 995.

Loss of minerals through the skin of infants. W. W. Swanson.—p. 1036.

VITAMIN A CONTENT OF MILK IRRADIATED BY VARIOUS CARBON ARCS. Feeding vitamin A deficient rats, showing extreme ophthalmia, at levels of 2.5 cc. and 5 cc. of milk, irradiated by different types of arcs for varying lengths of time, shows that the vitamin A content is not affected by the irradiation, as proved by the fact that the vitamin A deficiency is cured.

American Journal of Physiology

Vol. 104, April, 1933

The effect of the pasteurization of milk on the utilization of its calcium for growth in the rat. M. Ellis and H. H. Mitchell.—p. 1.

* An experimental study of a so-called "pellagra-producing" diet. T. D. Spies and J. Grant.—p. 18.

* The action of insulin on the motility of the empty stomach. J. F. Regan.—p. 90.

The effect of heating egg white on certain characteristic pellagra-like manifestations produced in rats by its dietary use. H. T. Parsons and E. Kelly.—p. 150.

Vol. 104, May, 1933

Observations on the blood of normal human subjects during fetal liver feeding. O. S. Walters and P. H. Woodard.—p. 364.

*The gastric hunger mechanism. The influence of experimental alterations in the blood sugar concentration on the gastric hunger contractions. M. G. Mulinos.—p. 371.

The effect of water administration on the development of anorexia and polyneuritic symptoms in pigeons subsisting on a diet lacking the vitamin B complex. G. R. Cowgill and M. L. Palmieri.—p. 484.

AN EXPERIMENTAL STUDY OF A SO-CALLED "PELLAGRA-PRODUCING DIET." Albino rats on a mixed diet of cornmeal, pork fat, artificially colored (synthetic) maple syrup, polished rice, cornstarch pudding, and sugar developed the symptoms characteristic of vitamin G deficiency—emaciation, alopecia, dermatitis and swelling around the eyes. When this diet was supplemented daily with small amounts of yeast, it was found that yeast protected against the deficiencies in the above diet, whereas casein did not. However, casein delayed the onset of the disease. Ventriculin possesses striking therapeutic properties as demonstrated by the rapid and apparently complete recovery of the animals from this deficiency. The correlation of the results obtained in the present experiment with those showing that ventriculin is curative for pernicious anemia suggests that the substance in the ventriculin which protects the animals from this inadequate diet may be vitamin G or some closely related substance and that this material is possibly the factor which Castle has discussed in the development of the deficiency state of pernicious anemia.

THE ACTION OF INSULIN ON THE MOTILITY OF THE EMPTY STOMACH. Intravenous injection of insulin in normal dogs produces a primary depression of tonus and contractions of the stomach followed by an increase in tonus and gastric activity which passes into an incomplete gastric tetany. Intravenous injection of insulin stimulates the sympathetic nervous system. There is a fall in tone and a quiescence of the stomach, acceleration of the heart rate, sweating, constriction of the peripheral blood vessels, and dilatation of the pupils in man. It is possible to keep the animals' stomach in a state of quiescence for a considerable time by giving repeated doses of insulin. This is a true insulin effect because the same type of response is obtained on injection of crystalline insulin preparations. The insulin response in normal dogs is identical to that reported for depancreatectomized dogs. The increased sympathetic activity and increased adrenalin output of the insulin have been correlated with the increased gastric activity.

THE GASTRIC HUNGER MECHANISM. IV. THE INFLUENCE OF EXPERIMENTAL ALTERA-

TIONS IN BLOOD SUGAR CONCENTRATION ON THE GASTRIC HUNGER CONTRACTIONS. Proof is offered for the theory that insulin hypermotility of the stomach, which has been found to exist, runs parallel to the effect of that substance on the central nervous system. The metabolism of carbohydrates and the glucose level of the blood seem to have no direct connection with the motor activity of the stomach. Gastric hypermotility which accompanies insulin hypoglycemia seems to be depressed by oral or intravenous administration of glucose.

American Journal of Public Health

Vol. 23, June, 1933

Relation of the use of milk to the physical and scholastic progress of undernourished school children. F. F. Lininger.—p. 555.
Fumigation of foodstuffs. C. L. Williams.—p. 561.
Purification of beet sugar waste. M. Levine.—p. 585.

American Restaurant Magazine

Vol. 16, April, 1933

Waitress manual analyzed.—p. 27.
Hidden flavor—another unique food study. H. Ewing.—p. 50.

Vol. 16, May, 1933

What your waitresses should know. C. M. Downey.—p. 27.
Let's feature our American dishes. H. Ewing.—p. 28.
Losses in cooking meats for quantity service. A. M. Child.—p. 39.

Hospital Management

Vol. 35, April, 1933

What dietitians are doing to solve current problems. H. E. Gilson.—p. 46.

Vol. 35, May, 1933

*Factors in efficient dietary service. L. Y. Gilbert.—p. 49.
How Harborview counts meals. M. W. Northrop.—p. 54.
Food service savings. Sister Julia.—p. 55.

FACTORS IN ECONOMICAL, EFFICIENT HOSPITAL FOOD SERVICE. The work of the hospital dietitian has expanded from corrective diets to include purchasing, preparation and service of food, and the selection of employees for the dietary department. A better type of employee is obtained if interest is taken in their food, and their surroundings. The teaching duties of a dietitian in an institution vary with the type of hospital. Qualifications for a dietitian include personality and executive ability, good business judgment, dietetics' training and background. The best dietitian cannot succeed without the support of the hospital superintendent, suitable equipment and sufficient help. Methods for economizing include standardization of portions, employment of regular people for tray service, study of yield from meats and fowl of different weights, examination of plate waste from patient's trays to determine the size portion to be served, substitution in menus and recipes for materials out of season, and the use of old grease for soap.

Hotel Monthly

Vol. 41, April, 1933

Gamut of grades of veal. A. Shircliffe.—p. 50.
Institutional silver. E. H. Handy.—p. 55.

Vol. 41, May, 1933

Catering facilities in world's fair.—p. 28.
Fruits that enrich the menu. A. Shircliffe.—p. 46.

Journal of the American Medical Association

Vol. 100, April 1, 1933

Calcium need and calcium utilization. A. R. Bernheim.—p. 1001.
Dehydration in epilepsy. J. L. Fetterman and H. J. Kumin.—p. 1005.

Vol. 100, April 8, 1933

*The use of autolyzed liver in the treatment of pernicious anemia. W. F. Herron and W. S. McEllroy.—p. 1084.

Vol. 100, April 22, 1933

*The change produced in fat tissue by the use of insulin in malnutrition. H. Blotner.—p. 1235.

Vol. 100, April 29, 1933

Reclassification of the anemias. R. Ottenberg.—p. 1303.
Polyneuritis of pregnancy. A dietary deficiency disorder. M. B. Strauss and W. J. McDonald.—p. 1320.
*The color of the nasal septum. A critical study of its supposed value as an index for dietary therapy in diseases of the upper respiratory tract. L. B. Bernheimer and D. J. Cohn.—p. 1324.

Vol. 100, May 20, 1933

*The higher carbohydrate diet method in diabetes mellitus. P. A. Gray and W. D. Sansum.—p. 1580.
*Pernicious anemia and tuberculosis: is there an antagonism? M. Barron.—p. 1590.

THE USE OF AUTOLYZED LIVER IN THE TREATMENT OF PERNICIOUS ANEMIA. The potency of autolyzed liver, prepared by digesting 1000 gms. of minced liver with 5000 cc. of fiftieth normal hydrochloric acid, using 25 cc. of chloroform as a preservative, was markedly greater than that of plain liver. The oral dosage requirement of autolyzed liver approaches the intramuscular requirement of other liver preparations.

THE CHANGE PRODUCED IN FAT TISSUE BY THE USE OF INSULIN IN MALNUTRITION. The use of insulin as a means of gaining weight was thought to cause a difference in fat composition. In experiments on a malnourished non-diabetic person there was found an increase of 13 mm. of subcutaneous fat with the diameter of the fat cells increasing 44.8 microns. The cells had a thick wall covering in malnutrition, but after the use of insulin, it became thin and membraneous in texture. Weight increase was a result of fat deposition, as in normal cases.

THE COLOR OF THE NASAL SEPTUM. No correlation could be found between the color of the nasal mucosa and the clinical symptoms of acidosis. The color of the nasal septal mucosa was found to be influenced by age, atmospheric conditions and other non-pathologic conditions. The use of diets high in foods producing alkaline or acid metabolic products, together with one adjunct acid or alkaline drug treatment failed to influence the symptoms or conditions either in a group of patients suffering from allergic nasal or respiratory disease or in a group with malaise or insomnia. In neither group did one diet affect the color of the mucosa of the nasal septum.

THE HIGHER CARBOHYDRATE DIET METHOD IN DIABETES MELLITUS. One thousand and five cases of true diabetes mellitus were treated with the higher carbohydrate diet method between Jan. 1, 1925 and Jan. 1, 1932. Arteriosclerosis has been the chief single cause of death. The incidence of arteriosclerosis seems to be more closely related to the age of the patient than to the duration of the diabetes. An improvement in sugar tolerance, as measured by either an increased diet or a reduced insulin dosage, was found in forty-two of the seventy cases in which this diet had been used. All patients reported a sense of increased well being and physical fitness. This seems to disprove the hypothesis that high carbohydrate feeding stimulates the secretion of endogenous insulin to the point of exhaustion. It does seem to prove that high carbohydrate feeding is not only possible and practical but also advantageous for the diabetic patient.

PERNICIOUS ANEMIA AND TUBERUCLOSIS. IS THERE AN ANTAGONISM? Chronic pulmonary tuberculosis in pernicious anemia is so rare that its incidence is practically negligible. The mechanism of the inhibition of tuberculosis is unknown, but it is probable that some constitutional factor which underlies the development of pernicious anemia, proves unfavorable for the evolution of pulmonary tuberculosis. Whenever the two diseases do co-exist, each seems to pursue a course entirely uninfluenced by the course of the other. The freedom of pernicious anemia cases from tuberculosis cannot be explained by the fact that "a person usually has only one major disease." There must be an antagonism between them.

Journal of Biological Chemistry

Vol. 100, April, 1933

The sexual variation in carbohydrate metabolism. The metabolism of diacetic acid in fasting rats and guinea pigs. J. S. Butts and H. J. Deuel.—p. 415.

Effects of overdosage of irradiated ergosterol in rabbits. Changes in the distribution of phosphorus in blood cells and plasma. G. M. Guest and J. Warkany.—p. 445.

The copper content of urine of normal individuals. I. M. Rabinowitch.—p. 479.

Vol. 100, May, 1933

*Studies on magnesium deficiency in animals. Chemical changes in the blood following magnesium deprivation. H. D. Kruse, E. R. Orent and E. V. McCollum.—p. 603.

Adsorption of vitamin B, by plant tissue. C. D. Miller and M. G. Abel.—p. 731.

STUDIES ON MAGNESIUM DEFICIENCY IN ANIMALS. III. CHEMICAL CHANGES IN THE BLOOD FOLLOWING MAGNESIUM DEPRIVATION. Restriction of animals to 1.8 parts

per million of magnesium leads to magnesium tetany. Weekly analyses of blood show decrease in magnesium content of the serum, increase in total cholesterol, a commensurate decrease in fatty acids and terminally the non-protein nitrogen rises. On the basis of symptomatology, magnesium tetany has been differentiated from other known types of tetany and chemical changes in the blood reveal no similarity between them and magnesium tetany. The magnesium syndrome is a separate and distinct entity; lowered serum magnesium is most likely the responsible factor in the pathogenesis of magnesium tetany. Magnesium deficiency is accompanied by changes in blood lipids entirely dissimilar from those of fasting. The terminal rise of non-protein nitrogen is explained on the basis of augmented protein metabolism following failure of the fat cycle.

Journal of Nutrition

Vol. 6, May, 1933

Effect of diet on egg composition. T. C. Byerly, H. W. Titus and N. R. Ellis.—p. 225.
*Comparative effect of tomato and orange juices. L. G. Saywell and E. W. Lane.—p. 263.
Studies on the rôle of zinc in nutrition. J. M. Newell and E. V. McCollum.—p. 289.
The calcium retention on a diet containing leaf lettuce. M. G. Mallon, L. M. Johnson and C. R. Darby.—p. 303.

Comparative Effects of Tomato and Orange Juices on Urinary Acidity. At the college of agriculture at the University of California experiments were carried out on men to determine the effects of tomato juice and orange juice on urinary acidity. Both were found to increase the pH of the urine when taken in addition to the regular diet. 1000 cc. of tomato juice produced a change of approximately 1.2 pH units, likewise, 1000 cc. orange juice 1.05 pH units. Commercially packed tomato juice is as effective as fresh. The ammonia excreted was correspondingly decreased as was the total acidity. Both juices produced a marked increase in alkaline reserve. The amount of organic acids excreted was increased in both instances. The present value of 93.8 per cent oxidation of organic acids of tomato juice nears that of 94 per cent for orange juice.

Modern Hospital

Vol. 40, April, 1933

*Helping the diabetic patient to help himself. D. E. Flitcroft.—p. 103.

Vol. 40, May, 1933

*How and why to use vegetables in the hospital diet. A. F. McCauley.—p. 102.

Helping the Diabetic Patient to Help Himself. The diabetic clinic in the Paterson General Hospital, N. J. has a series of lectures to instruct the diabetic about his condition and his diet. Their diets usually fall into three classes according to the amount of carbohydrate the patient can tolerate. The three groups are 65, 85, and 100 grams of carbohydrate. Fat and protein are not figured. Posters are used to supplement the lectures. The first lecture is arranged to tell the patient in simple terms just what diabetes is and what organ in the body is affected, and something about the classification of foods. Six other lectures cover subjects such as fruits, vegetables, preparation of meats, desserts not exceeding ten grams of carbohydrate, selection of menus, and recipes for main supper dishes.

How and Why to Use Vegetables in the Hospital Diet. The high mineral and vitamin content of vegetables has given them an important place in the hospital diet. To retain their nutritive value and remain attractive they must be prepared and served carefully. If fresh vegetables are not obtainable, those that are carefully preserved are available to serve in many ways. Experiments have shown that steamed vegetables lose only 15 per cent of their mineral salts as compared with a 30 or 50 per cent loss in boiled vegetables.

Practical Home Economics

Vol. 11, April, 1933

A dollar a day diet. L. Wampler.—p. 103.
Impressions of foods and markets here and there in Europe. G. G. Hood.—p. 107.
The further development of cooking. E. Brannigan.—p. 109.

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Manners and conduct in the school lunch room. F. Normington.—p. 145.

The school lunch as a management problem. E. Wilson.—p. 146.

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Meal planning from welfare food lists. D. M. Stackhouse.—p. 168.

*Buying fruits and vegetables for the cafeteria. L. H. Luebbers.—p. 177.

BUYING FRUITS, VEGETABLES FOR THE CAFETERIA. Not only must the buyer take precaution as to when she buys, but from whom she buys. Often the price of locally produced goods may be one-third more than the cost of that from the wholesaler. Other reasons for not patronizing the local producers are lack of quality due to non-grading and the temporariness of the market. The wholesaler is a dependable source of fresh fruits and vegetables throughout the year.

Regardless of the market which the buyer patronizes, she must demand prompt delivery, accurate filling of orders, quality and kind specified, full measures and weights and reasonable prices. The amount and kind of storage space should be considered before buying large quantities of semi-perishable foods.

NEWS NOTES

The American Dietetic Association has announced the appointment of Esther Kimmel of the Herald Tribune Institute as national publicity chairman for the convention to be held October 9–12.

The New England Health Education Association held its eighth annual meeting in June at the Massachusetts Institute of Technology. One of the four discussion groups was led by Gertrude Spitz, whose subject for consideration was nutrition and the school child.

The Chicago Dietetic Association was addressed by Dr. Sidney Portis, of Michael Reese and Cook County Hospitals, in April. Dr. Portis' subject was "Diet in Pre-operative and Post-operative Gall Bladder Treatment". At the May meeting Dr. Edward Hollingsworth of Edward Hines Jr. Hospital spoke to the group on the subject of "Diet in Cardio-renal Diseases". The last meeting of the season was a dinner meeting at the Chicago Women's Club, at which Dr. G. de Takats of St. Luke's Hospital was the speaker.

The Cincinnati Dietetic Association completed a series of interesting meetings for the year on June 5 when the members were guests of the Union Gas and Electric Company at a dinner at the Columbia Park Inn. After the dinner, at a short business meeting the following officers were elected: President, Gertrude Lauche; Vice-president, Gladys Leeper; Secretary, Ester Ernie; and Treasurer, Hazel Fullreide.

The program committee, with Mrs. Ruth Reineke as chairman and Laura Bryant and Elizabeth Bosch as coworkers, is to be especially commended for the interesting and varied programs which they planned for the year. Some of the more recent of these have been a meeting at the University of Cincinnati, where an enjoyable social and educational program was provided by the faculty of the School of Household Administration, a trip to the Food Research Laboratories of the Kroger Grocer and Baking Company, and an interesting talk on "Food Allergy" by Dr. Joseph Stein.

In previous years the membership of the association has consisted almost entirely of hospital dietitians. Recently, a number of dietitians in commercial fields have been added to the membership list. The older members of the association have been especially pleased to welcome them.

The Colorado State Dietetic Association met at Pueblo in April. Mrs. Cora Kelley Kusner, President, presided over the general session. Maude Sheridan spoke on "Dietetics from the Commercial Standpoint". Dr. R. H. Finney spoke on "Peptic Ulcer", and Louis Deesz on "The Food Situation in Russia". After the luncheon two section meetings were held. Mary Ritz, of Children's Hospital, Denver, presided over the Administration Section, and Harry Crunsleton spoke on "Institutional Buying from the Wholesaler's Viewpoint". Following the address a discussion was held on the economic purchasing of food. Fern Stone, of Denver General Hospital, was in charge of the Education Section. Following Violet Fuller's talk on mental hygiene, a discussion on the subject of dietetic instruction for nurses was held. A business meeting was held following the section meetings. Carrie R. Cook, of St. Anthony's Hospital, Denver, is secretary of this association.

The Indiana Dietetic Association held its annual meeting at Indianapolis in April. Following the address of Dr. John G. Benson of Methodist Hospital, Colleen Cox spoke on "Recent Trends in Nutrition", and Dr. Rollin H. Moser spoke on "Diet in Gastro-intestinal Disease". Dr. Charles P. Emerson, former dean of Indiana University Medical School, was the dinner speaker. Verna Ansorge was chairman of the program committee.

The Iowa State Dietetic Association held its semi-annual meeting with the Iowa Hospital Association in Marshalltown April 19 and 20. The following officers were elected:

President, Dorothy I. Anderson, College Hospital, Ames; Vice President, Vera Murray, Mercy Hospital, Cedar Rapids; Secretary, Ruth Ann Melvedt, St. Luke's Methodist Hospital, Cedar Rapids; and Treasurer, Evelyn Fresk, Methodist Hospital, Des Moines.

Dr. Kate Daum presented a report on national association business and urged all members to help in social relief work. Mr. Ray Scott, local attorney, spoke on "The Professions and the Present Economic Situation." Lucile Bruner, of Iowa City, discussed "Problems of the Social Service Worker". Marian Zichy, Superintendent Visiting Nurse Association of Marshalltown, read a paper on "Present Health Conditions". Dr. Julian Boyd, University Hospital, Iowa City, spoke on "Sane Standards for Children During the Present Economic Situation". Following the afternoon meeting, the dietetics class of the Deaconess Hospital served tea. At the joint meeting with the Hospital Association on the second day, Dr. Kate Daum spoke on "The Hospitals of Iowa and Their Relation to the American Dietetic Association". Dr. R. F. French gave a very interesting illustrated lecture on "An Indian Eye Clinic". At the Thursday luncheon, the Western Grocer Mills presented Dr. William H. Harrison, Research Director of the Continental Can Company, Chicago, Illinois, who spoke on "Commodity Trends". After the luncheon, the members enjoyed a trip to the Western Grocer Mills and the Marshalltown Canning Company.

The Maryland Dietetic Association held an annual business meeting at the Young Women's Christian Association Building May 10, 1933. Mary Diefenderfer, dietitian at the Maryland State Normal School, was re-elected president. The following other officers were elected for the coming year: Ruth Sperry, Vice President; Ruth Hoover, Corresponding Secretary; Anna Trentham, Recording Secretary; and Neva Lewis, Treasurer.

Miss Diefenderfer, in a brief message, expressed the feeling that the association had made decided progress during its first year as an organization affiliated with the national association. While the treasury suffered somewhat during the year, the records show that the Maryland Association now has more paid-up members than in any previous year as a city association. The executive board of the association formulated plans for the year 1933–1934 and appointed chairmen to head the various committees. Anne Merkle, of the Church Home Infirmary, was appointed a three-year member of the advisory board; Martha Manaham, of the Baltimore Dairy Council, heads the Program Committee; Elizabeth Saunders supervises the social activities; Vera Stemple is chairman of the Membership Committee; Jean Tait is in charge of the publicity for the association; and Elva Tatman is to plan for educational activities.

The Association regrets losing Florence Peters, who resigned from the Johns Hopkins Dietary Staff to accept a position with the State of Pennsylvania; Ruth Heath, who went to Purdue University, Lafayette, Indiana, as nutrition specialist for the Extension Service; and Eleanor Howe, who accepted a position in Chicago.

The Public Schools of Baltimore City gave free meals to 1500 children daily during the past school year.

Idell Collins has accepted a position on the dietary staff of the Sheppard and Enoch Pratt Hospital to fill the vacancy of Curry Nourse. Miss Collins was formerly associated with the Mt. Vernon Tea Room.

Very worthwhile meetings were held during the late winter and spring. The association was fortunate in having the following speakers and topics: Dr. Mary Pennington, who gave an excellent talk on "Refrigeration and Frozen Foods"; Mary Carden, an interior decorator of a local department store, who discussed "Decoration of a Dining Room"; Dr. Charles R. Austrian, of Baltimore, who discussed the "Medical Clinic"; Dr. R. E. Dyer, of Washington, "Typhus and Spotted Fever"; and Dr. Henry R. Geyelin, of New York City, "Treatment of Diabetes."

A program was given by members of the

association when student dietitians of Johns Hopkins Hospital gave reports on "Current Literature," "Foreign Foods," and "Case Studies." Round table discussion followed, with Anne Merkle discussing "Administrative Problems"; Mrs. Treascher "The Johns Hopkins Food Clinic"; Ruth Sperry "Table Decorations and Flavors in Foods"; and Vera Stemple "Health and Nutrition of the School Child".

Members also received much helpful information from the illustrative material loaned from the Chicago Business Office for one of the regular meetings.

As a final feature of the year's work, the members motored to Olney Inn. After a late afternoon rest on the spacious lawn a delicious dinner was served in the Maryland Room of the Inn, after which Mrs. Dawney spoke concerning her interesting experiences while developing Olney to its present status.

The Massachusetts Dietetic Association. On May 8 the annual banquet was held at the Lincolnshire Hotel. About forty members attended. Dr. Ruth Wheeler, Professor of Physiology and Director of Euthenics at Vassar College, spoke.

At the annual business meeting the following officers were elected: President, Mary Robertson, Massachusetts Memorial Hospital; Vice-President, Marian Woolworth, Children's Hospital; Corresponding Secretary, Blanche Levin, Beth Israel Hospital; Recording Secretary, Beth Burgy, Massachusetts Eye and Ear Hospital; Treasurer, Gertrude McDonald, Peter Bent Brigham; and Parliamentarian, Isabelle Lyons, Lawrence Memorial Hospital. Dr. Charles F. Wilinsky, Director of the Beth Israel Hospital, Boston, spoke on "Our Responsibility for Community Health".

The association has enjoyed a successful year, with a large attendance at all the meetings, and many interesting speakers. During the week of May 15 the annual inspection of the Boston hospitals was made by representatives of the American Dietetic Association. A reception was held for Mrs. Mary DeGarmo Bryan at the Gardner House of the Children's Hospital, to give her an opportunity to meet and talk informally with all the student dietitians.

The Milwaukee Dietetic Association held its March meeting at the Knickerbocker Hotel. Dr. Pretts of the Veterans Administration Hospital of Wisconsin reported on a study of a group of diabetics given high-carbohydrate, low-fat diets. He particularly emphasized the fact that the patients developed happier dispositions and less tendency to "cheat on their diets." He reported satisfactory clinical results, without an appreciable increase in the insulin dosage, for the patient using the high-carbohydrate, low-fat diet.

The association was entertained at Watts Department Store in April. A salesman for Pur Odor discussed the merits of his product. Anne Koerner gave an interesting lecture on "How to Appreciate Fine China", and a movie was shown, taken by Mr. Watts during his inspection of the Spode china factory in England. The guests were allowed to wander about the store at will admiring the lovely china and glassware.

The nominating committee suggested the re-election of the present officers for the coming year and the following officers were re-elected: Theresa Goetz, President; Ethel Milzer, Vice-President; Nell Clausen, Secretary; Bernice Stark, Treasurer.

Nell Clausen, Ada Lothe and Esther Deppe were guests of Elizabeth Tonigan, Director of Home Economics of the Milwaukee Vocational School, at a luncheon April 6. The purpose of the meeting was to review low-cost dietaries. The food supplies given by the Milwaukee County Department of Outdoor Relief to an indigent family of six, a father, mother and four children, were used as a basis for this study. Since the supplies are distributed to the indigent families every two weeks, the number of servings per pound of the various commodities were calculated and the food budgeted so that attractive and nutritious meals could be served throughout the entire period. This project has been made a part of the curriculum of the home economic courses and has meant a great deal to Milwaukee

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Phosphorus	0.620	0.392	0.125	0.093	0.093	0.180	
Iron	0.024	0.0038	0.0008	0.0009	0.00024	0.003	
Copper	0.0013	0.0005	0.00017	0.00034	0.000015	0.00023	
Moisture	7.0	8.0	10.90	35.30	87.00	73.70	
Protein	15.00	15.2	11.0	9.2	3.3	13.4	Calories, fats, proteins, and carbohydrates no longer constitute a serious nutritional problem.
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Calories per oz.	106	110	103	74	20	42	

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County in promoting its educational program of cookery and budgeting of low-cost foods.

The executive committee of the association met at the Colony Inn April 10 to discuss plans for entertaining dietitians attending the meetings of the American Medical Association, the American Hospital Association, and the American Home Economics Association, all of which are being held in Milwaukee this summer.

A delightful evening was enjoyed by the members, at Muirdale Sanatorium May 3, listening to Dr. Banyai discuss "The Diet for the Tuberculosis Patient". Dr. Banyai stated that racial food habits and food preferences of the patient should be considered to the fullest extent possible in an institution. Dr. Banyai stated that the dietitian has a great task and responsibility in any sanatorium, since a good, wholesome diet attractively served, is one of the essential elements in the convalescence of tuberculosis patients. The low-salt diet has been used in the treatment of many cases of tuberculosis at Muirdale Sanatorium with favorable results. Following Dr. Banyai's talk, Susan West announced the tentative program for the Home Economics convention in June. Anita Gehl and Helen DuChene were hostesses at the supper served after the lecture.

The members of the Association have had a profitable and interesting year, and are looking forward to the conventions this summer for further knowledge, friendships, and inspiration.

The Minnesota Dietetic Association. The March meeting was under the supervision of the Diet Therapy Section. Children's diets were discussed by Dr. A. V. Stoesser, pediatrician at Minneapolis General Hospital. Marion Weaver, therapeutic dietitian at Ancker Hospital, St. Paul, reviewed a case history of a patient following a gastrostomy. High protein diets in nephrosis was discussed by Esther Gayhart Bassett, dietitian at Veterans Hospital, Fort Snelling.

The fourth annual dinner meeting was held in April at the Buckingham Hotel, Minneapolis. Following the dinner the members of the Glen Lake dietetic staff, with the help of some able assistants, presented a clever and amusing stunt. Mrs. Winifred Howard Erickson, director of dietetics at Ancker Hospital, St. Paul, awakened convention enthusiasism when she spoke on "High Lights in the Coming American Dietetic Association Convention". Mrs. Henry Zavoral discussed "Food in Russia", based on her two year stay in that country.

New members of the Association are: Marion Weaver, Ancker Hospital, St. Paul, and Dr. Hope Hunt, University Farm Campus, St. Paul.

The New York State Dietetic Association held its fourth annual convention in Buffalo, April 24–25. Meetings were held at Buffalo City Hospital. The general program, arranged by the committee of which Blanche Bohach, Rochester General Hospital, was chairman, included the following: "Modern Methods and Equipment", Mr. J. M. Welch, Edison General Electric Appliance Company, "The Rôle of Diet in the Treatment of Disease", a clinic conducted by Dr. Abel Levitt, Buffalo City Hospital, and "The Largest Profession", Dr. Edward W. Koch, Dean of the School of Medicine, University of Buffalo. Speakers at the banquet, held at the Twentieth Century Club, were Laura Comstock, Nutrition Advisor, Eastman Kodak Company, who discussed "Nutrition Applied to Industry", and Anne Stewart, dietitian at Buffalo General Hospital, who gave her impressions of "Food Habits in Turkey". Luncheon was served both days in the hospital cafeteria, where opportunity was given to observe the operation of the plan where all employees select their food and pay according to their choice.

At the business meeting officers were elected as follows: President, Virginia Ray, Albany Hospital; Vice-President, Ursula Senn, Buffalo City Hospital; Secretary, Grace Carden, Strong Memorial Hospital, Rochester; Treasurer, Emma Feeney, Pratt Institute, Brooklyn. Dorothy Carruthers, Syracuse Memorial Hospital, was appointed first association historian. Interesting reports of the work of the Social Service and Education Sections were given by Jessie Cole, State Nutritionist, Albany, and Emma

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Through biologic assays it has been established that Canned Pineapple is a good source of vitamins A, B (B_1) and C; also that it is a fair source of vitamin G (B_2). One eight ounce serving of the fruit, with a proportional amount of juice, provides 72 units of vitamin A (Sherman and Munsell), 56 units of vitamin B (B_1) (Sherman and Chase), 32 to 56 units of vitamin C (La Mer, Campbell and Sherman) and 24 units of vitamin G (B_2) (Bourquin and Sherman).

This excellent fruit, naturally sun-ripened before it is picked, furnishes a uniform and dependable supply of these and other essential dietetic assets. Therefore, in addition to its delightful flavor and present-day economy, its many nutritional benefits warrant recommending Canned Pineapple for *daily* use. And the suggested daily portion is two slices, or an equivalent amount of the crushed fruit or tidbits.

Educational Committee

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Feeney, Pratt Institute, Brooklyn. An enjoyable trip through the Roycroft Shops at East Aurora completed the convention program.

The Ohio Dietetic Association held the twelfth annual meeting at the Commodore Perry Hotel in Toledo on May 19 and 20. About forty dietitians were registered. The program consisted of addresses by Dr. C. S. Mundy on "Diet and Arthritis," and Dr. A. P. R. James, dermatologist, on "The Relation of Diet to Skin Diseases". Sophia Bevins, City Dietetian of Toledo, discussed "Feeding the City". The following reports of studies carried on by the state group were made: Diet Therapy Section, "Adequacy of Hospital Discharge Diets", Bessie Wallace, Mt. Sinai Hospital, Cleveland; Education Section "Grading of Student Nurses in the Diet Kitchen", Geraldine Price, Grant Hospital, Columbus; Social Service Section "Emergency Nutrition Relief", Mrs. Ruth O. Reinecke, Cincinnati; and Administration Section "Cost Investigation", Mrs. Alta B. Hirsch, Miami Valley Hospital, Dayton. The banquet was held at the Mayfair Tea Room. Grace E. Smith, owner of the tea room and first vice president of the National Restaurant Association spoke on "Women in Business". The business meeting was held on Saturday morning and the following officers were elected for the ensuing year: President, Mary Louise Bone, University Hospital, Columbus; Vice-President, Florence Bateson, Cleveland Clinic Hospital, Cleveland; Secretary, Fernetta Lusher, Flower Hospital, Toledo; Treasurer, Dorothy Proud, University Hospitals, Cleveland.

Ontario Dietetic Association. The second annual meeting was held April 28 in Toronto. During the morning session in the Household Science Building papers on nutrition were read by Dr. F. F. Tisdall, F.R.C.P., Associate in Pediatrics, University of Toronto; Dr. Elizabeth Chant Robertson, M. A., "The Effect of an Inadequate Diet on Resistance to Infection" and Lida M. Burrill, "The Effect of Cooking on the Rate of Digestion of Cereals".

At the luncheon meeting, Violet M. Ryley, supervising dietitian of the T. Eaton Co., presiding, reports of the year's work were read by the four section chairmen: Margaret Rees, Administration; Alice Pidgeon, Diet Therapy; Mame T. Porter, Education; and Margaret McCready, Social Service.

During the afternoon session a tour conducted by members of the staff of the School of Hygiene was made through the Connaught Laboratories, University of Toronto, where insulin, liver extract and other physiological products are made on a large scale for distribution throughout Ontario. Papers were read by two members of the staff of the Ontario Research Foundation, A. D. Barbour, Ph.D., "The Effect of Feeding Lard and Hydrogenated Shortening on Body Fat" and W. C. Henry, B.A., "The Beating of Egg Whites."

Social events of the day included afternoon tea at the Sick Children's Hospital and the banquet in the evening at the Arcadian Court, Robert Simpson Company, at which more than two hundred people were present. Marjorie Bell, head of the Visiting Housekeepers' Association described the problems of distributing relief supplies and how they were being overcome in order to ensure an adequate diet for all. Alice M. Hamill of the Ontario Department of Education spoke on home economics in vocational schools. Ruth M. Park, director of the dietetic department, Montreal General Hospital, showed the work of the diabetic clinic of that hospital.

Annie L. Laird, who presided, presented the members of the new executive committee as follows: Honorary President, Annie L. Laird; Honorary Vice President, Violet M. Ryley; President, Lorena A. Richardson; Secretary, Wilma Gear; Assistant Secretary, Josephine Booth; and Treasurer, Evelyn Creed.

Gretta Johnston, formerly of the Ottawa Civic Hospital, is now Mrs. Archibald McGugan and living at Clinton, Ontario.

Ebba Rupert (Mrs. A. R. Hatch) may be addressed at 306 West 76th St., New York City.

Ernestine Partridge is director of the house service department of Canadian Canners, Limited, with head office at Hamilton,

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IT was found that the new MALTINE WITH COD LIVER OIL was palatable and easily tolerated by children and adults, many of whom had previously found it difficult to take plain cod liver oil. More recently, tests of various kinds, including biological and clinical, have shown that MALTINE WITH COD LIVER OIL has other characteristics, besides palatability, to recommend it.

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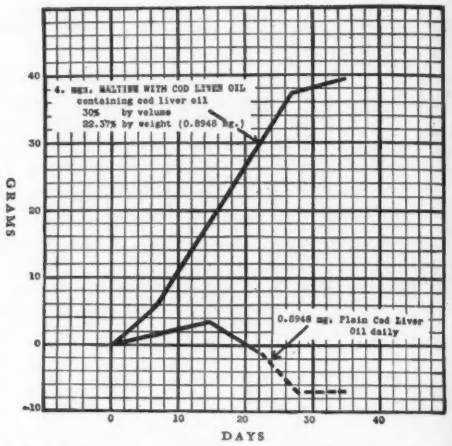

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**Janes, E. R., Grover, H. F., and Quinn, E. J., "A Method of Enhancing the Vitamin A Value of Cod Liver Oil," Proc. Soc. for Exper. Biol. and Med., January,* 1933, *p.* 516.

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Ontario. This is the largest canning organization in the British Empire.

The Pennsylvania Dietetic Association. The first annual meeting was held at Schenley Hotel in Pittsburgh, May 5–6. Judging from the registration and aims accomplished the meetings were most successful. The president, Irene Willson, her officers, and the local Pittsburgh association may well feel proud of the program they presented. Among the speakers were Drs. C. G. King, Leo Criep, Joseph Barach and R. A. Dutcher.

The election of officers resulted as follows: President, Mary Huhn, Scranton; President-Elect, Emma Smedley, Philadelphia; Vice President, Pauline Saunders, Greensburgh; Secretary, Mary O'Brien, Scranton; Treasurer, Minerva Harbage, Philadelphia.

Members will long remember Pittsburgh as the scene of the first state meeting, and the Montefiore Hospital Staff for their gracious hospitality at the farewell dinner party.

The Rhode Island Dietetic Association held eight meetings during the past year, each having a large attendance. At the December meeting, reports of the American Dietetic Association convention were given. In January a joint meeting was held with the Rhode Island Home Economics Association, when "The Newer Developments in Nutrition" were discussed by Dr. Grace McLeod of Columbia University. The February meeting marked the tenth anniversary of the state association. A dinner and social hour were enjoyed at the Plantations Club. In March Dr. Fitzpatrick of Butler Hospital talked on "Personality". Eunice Smith, R. N., Superintendent of Nurses at Homeopathic Hospital, conducted an interesting discussion on the "Relationship between the Nursing and Dietary Departments" at the April meeting. In May Dr. Gleason spoke on "Child Welfare in the State". During the past year the association has become affiliated with the American Dietetic Association.

The St. Louis Dietetic Association. The first meeting of the year was held at St. Louis Maternity Hospital. The following officers were elected: President, Florence Levy of City Hospital; Vice-president, Mrs. Marie Harrington of the St. Louis District Dairy Council; Secretary, Mrs. Merle Pittman of Barnes Hospital; and Treasurer, Edith Tilton, also of Barnes Hospital. The following meeting was devoted to problems of relief in the community. Flora Slocum, home economist of the St. Louis Provident Association, discussed "Standard Budgets" and Marguerite Newmeyer, executive director of the Jewish Social Service Bureau, spoke on "Relief and What It Means". At this meeting a motion was made and carried that the Association offer their assistance to the relief agencies in the city. Those who have been active on the Community Council relief budgets are: Mrs. Rossellene Hettler, Annette Alpern, and Ruth Kahn.

The November meeting was devoted to a discussion of the convention by Ruth Kahn and Florence Levy. For the December meeting a benefit bridge was given at the new City Hospital Nurses' Home and twenty-five dollars was given to the United Relief Fund.

The new year brought two interesting speakers: Dr. William Nelson, psychologist, "Psychology of Food Habits"; and Dr. McCulloch "Food in Relation to Health". The February meeting was devoted to a discussion on "Food Allergy" by Dr. Katherine Bain, and "Endocrine Disturbances", Dr. Louis Cohen. Mrs. Richard Baumhoff spoke on the "Standardization of Dietitians" at the March meeting. The April meeting was a trip to the St. Louis Glass and Queensware Company when Mr. O. C. Henke spoke on "China for Institutional Use".

The final meeting of the year was devoted to the interest of the student dietitians. Mary Tupper, University City School Cafeterias, gave a résumé of her work. Olive Negus, Purina Mills, spoke on "Commercial Cafeterias". Miss Dolan, St. Louis Maternity Hospital, gave suggestions about the serving of attractive trays. Catherine Faite, Washington University School of Nursing, gave an outline of her methods of

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teaching dietetics to student nurses. Florence Levy, City Hospital, discussed special diets in a city hospital. Ruth Kahn, Washington University Medical School Clinics, spoke on food clinics and also gave a report on the activities of the Budget Committee of the Community Council.

Dr. E. V. McCullum of Johns Hopkins Hospital recently addressed the Missouri State Dental Convention on "Nutrition in Relation to Teeth". The dietetic association was invited to attend.

Mrs. Eugenia Martin Sharder, formerly of Barnes Hospital, has a daughter.

Margery Ewer, former student of Barnes Hospital, is now dietitian at City Sanatorium.

The Virginia State Dietetic Association. The spring meeting was held at Memorial Hospital, Richmond, April 8. A report from Mrs. McIver, program chairman, stated that Dr. Edgar C. Harper of Richmond would speak on "Vitamin Deficiency" and Mr. Willis Sherman, Fresh Fruit and Vegetable Expert, U. S. Department of Agriculture, would speak on "Present Conditions Influencing the Values of Fresh Fruits and Vegetables" at the dinner meeting. Mrs. McIver also extended an invitation for the state association to meet in November with the Norfolk Home Economics and Chemistry Club at Norfolk.

Officers elected for 1933 were: President, Anna Hudson; Vice-President, Aileen Brown; Secretary, Ruth K. Wright; Treasurer, Lois Watts.

A vocational round table was held with the following talks: "College Curriculum Changes for Students Interested in Advanced Nutrition", Amalia Lautz, Associate Professor of Nutrition, Teachers College, Fredricksburg; "College Cafeteria Work", Doris Woodward, University Commons, Charlottesville; and "The Feeding Problems with Mental Cases Compared with Those in General Hospitals", Ruth K. Wright, Davis Clinic, Veterans Hospital for Mental Diseases, Marion.

The Western Michigan Dietetic Association held a dinner meeting May 5 at Butterworth Hospital, Grand Rapids, with Mrs. Mary Harmon Riste, hostess. Dr. H. C. Robinson told of the work with diabetic cases under the city welfare. Dr. Helen Mitchell reported on the visit of Dr. Mary S. Rose and Dr. Grace MacLeod to Kellogg Company, Battle Creek, and of the talks given before the home economics students at Battle Creek College.

The annual report of the New York Academy of Medicine for 1932 states that Dr. Margaret Barclay Wilson was the donor to the library of another thousand books, about half of which are on the subject of foods and cookery. The JOURNAL of March, 1930, mentioned a previous gift of Dr. Wilson, including a famous ninth century Latin manuscript of fifty-eight leaves of the work of Caelius, a collection of recipes made in the third century, A.D., and founded on Greek originals. Several students from Hunter College did volunteer work in cataloging this large collection. Author cards are now complete for all the books.

Department of Welfare, commonwealth of Pennsylvania. Announcement has been received of the appointment of Florence Peters as Nutrition Consultant in the Department of Welfare to succeed Katharine A. Pritchett, who left in August, 1931. Miss Peters is a graduate of Teachers College, Columbia University, and for seven years has been assistant dietitian at Johns Hopkins Hospital, where she had experience in all phases of food administration, menu-making, marketing, the supervision of special diets and the teaching of dietetics. Miss Peters has worked closely with Dr. E. V. McCollum, Professor of Biochemistry at Johns Hopkins. This contact has enabled her to keep abreast with developments in the field of nutrition that have proven to be theoretically and practically sound.

The Department of Welfare, according to Mrs. Alice F. Liveright, Secretary of Welfare, has felt handicapped in not being able to give state institutions adequate and competent service in the field of nutrition, and believes that during the coming two years the

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Rich in Vitamin B — the factor which may be needed to restore the patients' normal hunger

EVEN when they are well, grown-ups and children are likely to receive too little Vitamin B in their diet. The average diet of white bread, meat, potatoes, and pastry all too often does not supply enough.

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For nursing mothers—In order that their milk may be rich in Vitamin B, mothers need three to five times as much of this important factor as normally. Chocolate flavored Vitavose makes it easy for them to obtain the necessary amount. Chocolate flavored Vitavose will not cause digestive upset. It is pleasantly flavored but not too sweet. Serve it daily to mothers during lactation.

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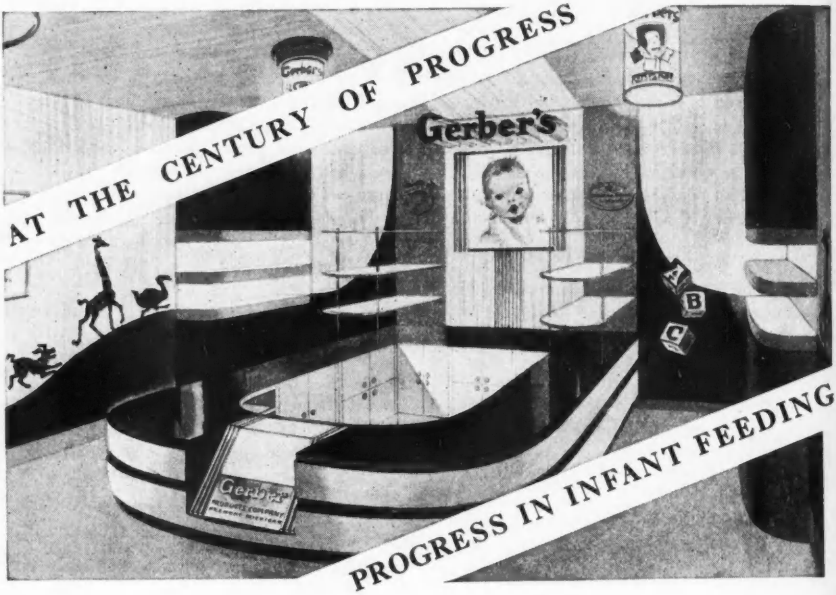
managements of the state institutions will be forced to make the best possible use of the money which can be set aside in their budgets for foods. Miss Peters is now engaged in preliminary studies for the Department, but will visit each state institution at her earliest convenience.

The Food and Drug Administration at Washington is engaged in formulating plans for redrafting the present Food and Drugs Act, and is inviting suggestions from consumers and consumer groups relative to features which they believe will serve to give a greater measure of protection to the public. They request that groups and individuals send their suggestions to the Administration as soon as convenient.

The Centennial Commission of the First and Second District Dental Societies of the State of New York announces that six hundred dollars in prizes will be awarded in December, 1934, for four essays on various aspects of dentistry. Further information may be obtained by addressing The Centennial Dental Commission, Academy of Medicine, 2 East 103 Street, New York City.

The J. B. Ford Company announces that Mr. L. D. Dodson has assumed charge of the New York office of The J. B. Ford Sales Company. Mr. Dodson has for several years been in the main office at Wyandotte. Mr. Gline, formerly New York manager, has been detailed to special work on national accounts with headquarters in New York.



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WHO'S WHO IN THIS ISSUE

DR. HERMAN O. MOSENTHAL occupies an authoritative position from the standpoint of clinical and research work in internal medicine, with especial emphasis on diabetes mellitus, nephritis and hypertension. Dr. Mosenthal has contributed over sixty papers to scientific publications, and is a contributor to Nelson's *Encyclopedia, Medical Clinics of North America,* Tice's *Practice of Medicine,* Nelson's *Loose Leaf Living Medicine,* and the *Oxford Monographs.* Among his numerous affiliations and teaching and clinical appointments, Dr. Mosenthal is a member of the American Society for the Advancement of Clinical Investigation, American Gastroenterological Association, and Society of Experimental Biology and Medicine. He was Associate in Biological Chemistry at Columbia University and Associate Professor of Medicine at Johns Hopkins Hospital. He is now Professor of Medicine and Attending Physician, New York Post-Graduate Medical School and Hospital, Professor of Medicine at Columbia University, and Executive Officer of the Department of Medicine of the New York Post-Graduate Medical School.

CALLIE MAE COONS, Associate Professor of Agricultural Chemistry Research at Oklahoma Agricultural and Mechanical College, Stillwater, since 1929, received her B.S. from the University of Colorado, her Ph.D. from the University of Chicago. Dr. Coons' research interests and publication have centered around the metabolism of women, particularly during pregnancy. She received an American Association of University Women fellowship for her study of mineral metabolism in southern women during gestation.

P. MABEL NELSON, PH.D., is Professor and head of the Department of Foods and Nutrition at Iowa State College. She received the B.S. and M.S. degrees from the University of California, 1915 and 1916, and the Ph.D. degree from Yale University, 1923. She is a member of the American Dietetic Association and is keenly interested in preparing students for their dietetic interneships and in promoting opportunities for their professional advancement. GENEVA P. CROUCH received the B.S. degree from Prairie View College, 1925, the M.S. degree at Iowa State College, 1931. She is teaching home economics at Prairie View College, Prairie View, Texas.

MARY MARGARET SHAW is Professor of Home Economics at the University of South Dakota at Vermillion. She received her Master of Science degree in foods and nutrition from Kansas State College. She has continued her studies at Columbia University and the University of Chicago. She taught two years at Michigan State Teachers' College, Ypsilanti, and for the past five years has held the professorship at the University of South Dakota.

BERNICE WAIT AND LYDIA J. ROBERTS were contributors to the September, 1932, November, 1932, and January, 1933, issues of the JOURNAL.

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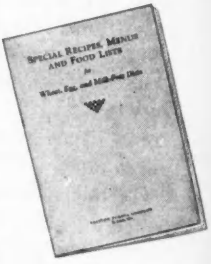

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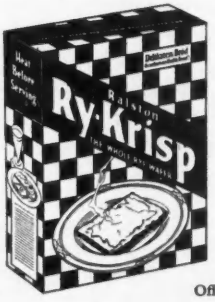

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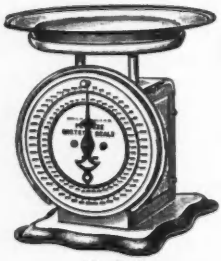

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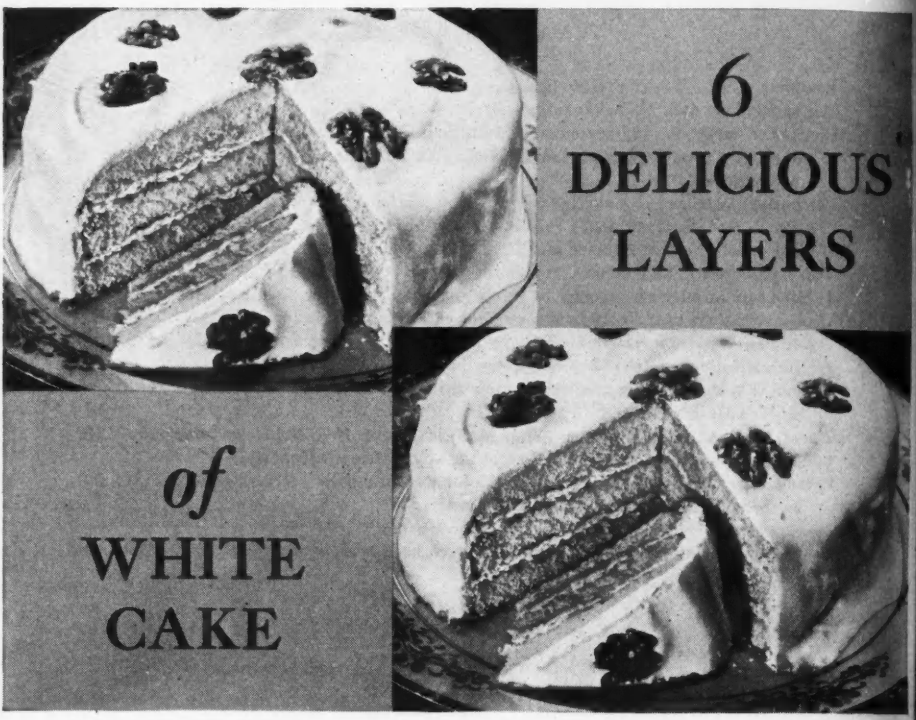

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